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Volume 25 **JANUARY-FEBRUARY** **Number 1**

Physical Therapy in a Plastic Surgery Unit

Honor C. Wilson, Capt. (A.A.M.C.) A.I.F.

Wartime has special indications for plastic or reparative surgery. Advances in this work are fast accumulating from the amount being done and under the special arrangements made for it in most medical services. This is an asset from which the treatment of injuries in all spheres of life will benefit.

Though this most interesting aspect of surgical work often is hazardous and difficult, it produces results which far and away compensate for the time and work expended and which establish the advantage of teamwork as opposed to individualism. The Facio-Maxillary and Plastic Surgery Units of the Australian Army Medical Corps include a physical therapist as a member of the team.

In this unit, the physical therapist has an important place and a most varied range of work. As the place of a physical therapist in such a unit has not long been fully established, and as the nature of the work expected of her has in no definite way reached either the general knowledge or the literature of physical therapists, this paper is written that it may be of some interest and even of help to those who hope to or are called upon to pursue this type of work.

To give some indication of the scope of the physical therapist in plastic surgery units, these notes of necessity must be somewhat fragmentary; but some aspects of the work will be discussed under headings relative to the main groups of cases which are treated in these units.

Burns

During all phases of training and action, burns result from many causes: scalds, oil burns, explosions or fires.

In the routine management of burns, large numbers of extensive raw areas from third degree burns are prepared for skin at the earliest opportunity. In the routine preparation and aftercare, the physical therapist has to work to maintain and restore function in the presence of open wounds, often occurring in very sick patients. Thus asepsis on the part of the physical therapist in the handling of such cases must be strictly adhered to. Her routine must fit in with the routine of general ward and surgical management in time and nature. As part of the object of preparation is reduction or elimination of surface sepsis preparatory to skin grafting—

(1) A gauze mask is worn, covering the nose and mouth. It contains a cellophane paper inserted between the two layers of gauze. The patient also is masked in the presence

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I also wish to thank the Director-General of Medical Services for permission to submit this paper for publication.

of any extensive wound, e.g., in a bath or during a dressing.

(2) Thorough cleansing of the hands and forearms is important, especially if they have to be immersed in a bath to assist in limb movements. We rely on plenty of soap and running water, and do not habitually use a nail brush. The hands and forearms are then dried on a sterile towel or gauze before treating.

(3) To lessen the risk of secondary cross-infection, handling of unhealed parts always is to be avoided on the part of the patient and the physical therapist. It is important always to use the advantage of having a part unembarrassed by dressings, and if movements cannot be carried out in a bath, they are done during dressings when the limb with an open wound is devoid of outer dressings—the part resting on a sterile towel.

Lanoline massage is extensively used on recently healed and scarred areas. Lanoline loses some of its special properties when repeatedly sterilized, and so each patient has his own pot of lanoline to prevent cross-infection when there are any unhealed areas, as is often the case with extensive scarred and grafted areas following a burn. A sterilized spatula is used to get the lanoline from the pot.

Saline Bath Treatment

The saline bath treatment frequently is used in the preparation of large raw areas for skin grafting. As soon as it is practicable, the patient is immersed in a full-length bath, an arm bath or a foot bath, as the site and extent of the burn warrants. The saline solution used is at body temperature, and baths should be constructed so as to enable the full range of movement of each joint. For a burn involving the elbow joint, for example, the bath must be wide enough comfortably to obtain full flexion and extension. The large T-shaped baths are ideal to obtain the necessary abduction of legs and elevation of arms, such range of movements being very limited by the shape of the ordinary bath. From the physical therapist's point of view, the advantages of a bath routine are: (a) it enables the patient to move each joint through as complete a range as possible, unembarrassed by dressings which are allowed to float off; (b) it is soothing to the raw areas, and the patient relaxes and feels comfortable, and (c) the heat aids circulation and joint mobility.

In the early stages the object of physical therapy is to keep the joints mobile rather than to tone or build up muscles, thus three to six movements for each joint are sufficient. Later on, underwater massage is beneficial to poorly toned muscles, e.g., the deltoid muscle, when there is a burn at the acromiopectoral region. Later again, exercises can be added to increase muscle tone.

It is important that the physical therapist be firm but cheerful and understanding with those patients who are often most trying. She must inspire confidence so that the patient will help himself to the fullest extent and at the earliest opportunity. He will persist despite some discomfort if he understands the importance of early movement to his future progress and result. Very soon, he will be a happier man and look forward to his bath treatment when he can relax and move himself freely within the limits of pain, unembarrassed by dressings.

This procedure is carried out for all second and third degree burns. When the superficial second degree burns have spontaneously epithelialized (as they rapidly do with such management), a course of lanoline massage and graduated exercises is given until the patient is discharged. With third degree burns, this latter regime must be withheld until skin grafting effects healing. After skin grafts, the period of pressure dressing and immobilization required depends on the type of graft. Assisted active exercises are begun after the second or third dressing, i.e., after approximately fourteen days. When the area is healed, lanoline massage and active exercises are started locally at first, increasing to include the whole musculature, preparatory to weight-bearing.

To prepare grafted areas for the eventual change of position from horizontal to vertical, the legs in pressure bandages are hung over the sides of the bed or a chair, beginning with five to ten minutes, three times daily, increasing this period each day if no marked blueness or hematomas appear for a period up to half an hour. Edges which have healed by second intention will need careful watching, as they are prone to edema and hematoma beneath the scar, with instability, breakdown and ulceration. Pressure bandages should begin well below the graft, continuing in a spiral direction with even pressure above it. Pressure bandages are maintained until the new graft is stable and a good color, i.e., with no sign of blood stagnation or hematomas. With large grafted areas on the legs, pressure bandages are continued during weight-bearing for three to six months. A pot of lanoline is given to these patients on discharge from hospital, with which to continue their own massage on the burned

and/or grafted areas until they are soft and pliable.

The advantages of lanoline friction massage may be summarized thus:

(1) It improves the blood circulation of the new skin area and assists the resolution or softening process in scarred areas.

(2) It aids lymphatic drainage.

(3) The new skin is at first very dry, woody and sometimes wrinkled. Lanoline massage helps tremendously in its softening and aids its freedom of movement over underlying tissues.

(4) It acts as a lubricant for the physical therapist's hands, preventing trauma on newly-formed skin, prone to blister.

(5) Some healed areas after burns form keloids which may be irritable and very sensitive to touch. Lanoline dabbed on them lessens the irritation pending x-ray therapy, or operation.

Illustration: Case 1—Extensive third degree burns—skin graft.

5/18/41: Patient sustained extensive burns from a petrol explosion in the Libyan desert.

7/14/41: He was admitted to this Unit (then attached to a General Hospital in Egypt). He had second degree burns of both forearms and hands, almost healed, and large raw areas from third degree burns on the posterior surfaces of both legs, extending from below the knees to and including the buttocks. He arrived in a very emaciated, terror-stricken condition, extremely stiff, muscles very wasted and with the bony prominences very marked. He could not lift his legs against gravity, but in a saline bath where he soaked two to three hours daily, his hip and knee flexions were 10 and 20 degrees respectively. He soon learned how to relax and move his limbs freely within limits. He usually read in the bath.

7/23/41: The raw edges were grafted with pinches (Fig. 1-A).

7/27/41: He developed a R foot drop with paralyzed peronei, considered to be of a toxic or infective origin. A light plaster cast was made to rest the paralyzed muscles.

8/3/41: He had started assisted active movements again in the bath; all areas were not quite healed at this stage, so these exercises were given guardedly.

8/13/41: The R knee flexion was 15 degrees, L knee flexion 25 degrees, and the L leg lifted against gravity for the first time. The R and L hip joint flexions were 45 degrees with the assistance of the saline buoyancy. His general condition warranted general arm and breathing

A

B

Figure 1. Extensive third degree burns of leg. (A) General emaciation associated with large raw areas and active epithelialization from a crop of pinch grafts seven days old. This was the only available method of grafting under the conditions at that time. (B) The same patient one year after healing and stabilization was effected by pinch grafts.

exercises at this stage. Daily lanoline massage to all scarred areas of arms and hands was kept up from the beginning.

9/2/41: His legs again were immobilized, as there still remained a few raw areas on the posterior surface of the L knee and anterior R thigh, where a crop of pinch grafts was placed.

9/10/41: The R knee flexed 20 degrees and the L knee 35 degrees. Hip flexions were now 57 degrees, and the peroneus longus was noted to be contracting weakly. After his bath, dressings and pressure bandages were still applied, and he had general exercises in his bed.

11/4/41: He left on the Hospital Ship for Australia, 5½ months after his initial injury, still with marked stiffness of hips and knees; the R and L hip flexions were 50 and 90 degrees respectively, R and L knee flexions 30 and 60 degrees respectively. There was no return of the anterior group of foot muscles; peroneus longus alone was improving slowly.

4/28/42: He was followed up on the Unit's return to Australia. In the meantime, he had had a great deal of physical therapy. The knees flexed 90 degrees; hip flexion and extension were not quite complete, but movements were more than useful for average requirements. He could do "heels raise, knees bend" with ease to the limit of the stated degrees, and the R foot was almost as strong as the L. He was readmitted two months later for a small graft to an unstable area behind the R knee, and was boarded A2, i.e., not fit for tropical service (Fig. 1-B).

We feel sure that if this case had had the adequate early movements which were not feasible under the then-present local wartime conditions, we would have had a 100 per cent function at a much earlier date.

Illustration: Case 2—Second degree burns—no skin loss; rapid healing and return of function.

7/16/42: A patient was admitted with a healed superficial second degree burn, the result of steam from a truck radiator. The burns involved the R upper arm, axilla and chest. His R shoulder was raised and head tilted to the R. His arm could be abducted to 90 degrees, but beyond that there was pain and tightness along the anterior axillary fold. After lanoline massage and exercises, twice daily, he was discharged with full elevation after a fortnight.

In such cases, there is no skin loss and early healing with negligible fibrosis enables early active physical therapy and a rapid return to full function.

SOFT TISSUE WOUNDS OF THE BODY AND LIMBS

These injuries arise in devious ways by explosions from booby traps, land mines, trench mortar bombs, explosive bullets, hand grenades, and so forth. They frequently involve the limbs and may entail the loss of skin, subcutaneous tissue, nerves or muscle or bone in varying degree, according to the depth of penetration and the direction in which the missile enters the body. Soft tissue injuries like burns heal to form scars, small or big, superficial or deep.

Treatment of Small Scars

If a scar is small and slightly adherent to underlying structures, lanoline friction massage aids considerably in freeing it. If a small scar is freed by operation from underlying structures, friction massage seven days after operation prevents recurrence of adhesion. Prior to local rearrangement of soft tissues or to free grafts about recently healed areas, seven to fourteen days' deep provocative massage (deep frictions) on and around the scar area is useful in stirring up or manifesting latent infections. Short-wave therapy has been used, but massage is more effective, provided it is given at the required depth.

With contracting scars across flexure lines, such as the axilla, when surgical correction is to be undertaken, stretching always should be avoided as the underlying already-scarred areas are easily traumatized, setting up more inflammation with increased fibrosis. Active exercises should be given only within the limit of a stretch. The same reasoning must be applied after a scar has been replaced by new skin when there is still a scarred edge yet unstable. Scars over joints, e.g., the elbow, require early excision, as constant normal movement can traumatize and cause hypertrophy of the already scarred areas.

If a scar is firmly adherent to the fleshy belly of a muscle, or to the tendons, e.g., on the anterior lower leg, and if muscle contraction ceases at the point of adherence, muscle reeducation prior to operation on the scar assists in toning up the proximal muscle fibers, so that he has a good start after operative correction. A patient's outlook always is improved if he can see and feel the muscles functioning, even though they are not producing their appropriate movement because of the scar.

Types of Skin Grafts Used on Wounds

Pinch grafts and Thiersch (split skin) grafts are used as palliative grafts to heal large wounds. They often give finite results, but later may be replaced by thicker and more stable grafts, such as—

(1) Dermatome grafts, i.e., thick split skin. These may cover large areas and are most satisfactory on the dorsum of the hand, for example.

(2) Wolfe grafts (full thickness skin) replace scar where it is most important to have the most possible stability as well as mobility and elasticity, e.g., on the palm of the hand and fingers, and on the face. In texture, they are the most satisfactory of all grafts and ultimately look and behave as normal skin.

All grafts, when healed, are treated with lanoline friction massage for reasons already stated.

(3) Flaps of skin and fat are used extensively in scar replacements over more vulnerable areas, such as bony prominences, or when deep scar is removed from muscles, tendons or bone, and sometimes in replacing scar preparatory to bone grafting, tendon repair or nerve operation. These flaps are obtained in various ways, either:

(a) *locally*—by rotation or advancement from neighboring areas in manifold ways;

(b) by *direct* apposition from some body parts, e.g., abdominal flap to the hand, or a cross leg flap from one leg to the other;

(c) *indirectly;* flaps transposed from one part to another via an interval host attachment, e.g., abdominal flap via the wrist to the face, or

(d) *tube pedicle flaps;* in some cases, the migrating flaps are made into a tube before being moved. They may then be moved by direct transfer from donor to recipient sites, e.g., chest to face, or via a host attachment, most commonly the wrist, or they may be migrated in a "caterpillar" fashion.

Treatment of Flaps

In all direct flaps, massage helps the comfort of the patient during the early stages of immobilization. Movements are assisted and encouraged within the safe limits permitted by the attachment and the plasters, or whatever immobilization agents are used. Patients are afraid to do these restricted movements at first; but it takes little instruction and assistance to tide them over to a period of routine movements and exercises, which are the chief aid to prevention of stiffness and cramps in limbs and areas embarrassed by such attachments.

Massage is required for grafted donor areas and the suture lines of flaps to keep them mobile on deep structures. Graduated functional exercises are given when areas are healed, and pressure bandages on flaps on dependent areas are applied in the same way as described in treatment after burns.

The Advantages of the Tube Pedicle Graft from a Physical Therapist's Point of View—

(1) While the pedicle (a flap of skin and fat, sutured to form a tube) can be easily moved from one part of the body to another, e.g., an abdominal pedicle via the wrist to any part of the lower limb, the injured limb can be treated during all stages of the migration.

(2) Owing to its length and flexibility, exercises can be given during the attached stage within the limits of pedicle stretch. This prevents joint stiffness and loss of muscle tone.

(3) In the stage from abdomen to wrist (second stage—Fig. 2-A), after the suture line is healed, patients can get up, clothe themselves, and use both their hands for ordinary use, as well as for occupational and diversional therapy.

In the stage of wrist to leg attachment (third stage), although patients become more helpless, they can still get about by propelling themselves in a wheel chair. The final flap from the spreading of an abdominal pedicle can replace large, unstable scarred areas, superficial or deep. A large number of our cases have been lower limb conditions requiring this form of reconstruction. For example,

(a) Large unstable scarred areas following ulcers on and about the anterior crest of the tibia, which break down at the slightest trauma.

(b) Large scars adherent to muscle, nerve or bone.

(c) Scarred areas over delayed union or ununited fractures where indicated; bone grafting operations require a preliminary scar replacement.

(d) Bone cavities or surface bone sepsis, often with surrounding adherent scar. Replacement by a vascular flap aids natural control of sepsis and permits final healing.

(e) Scars from wounds of the foot, adherent and unstable about heels, ankles and metacarpal heads, or where a soft tissue pad is required over bone ends, often resulting

A

B

C

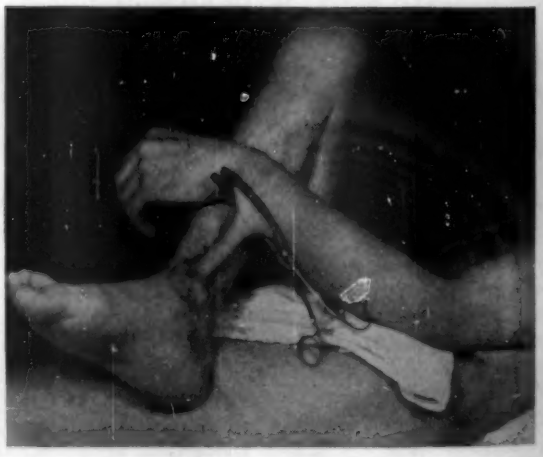
Figure 2. Stages in migration of a pedicle to the leg, where physical therapy can be applied with benefit. (A) Abdomen to wrist attachment —second stage. The first stage was raising of the pedicle on abdomen. (B) Wrist to leg attachment—third stage. This was a case of extensive unstable scarring of the leg, following a gunshot compound comminution of the tibia. Full extension of the knee and elbow joints can be obtained. (C) The same case, illustrating how full flexion of the knee and elbow joints also can be obtained. (D) Method of strangulation on the wrist attachment preparatory to detachment and spreading of the pedicle on the leg. Note the strong rubber band which approximates the distal ends of the well padded small Peyers bowel clamp.

from the loss of some or all of the toes.

(f) For short amputation stumps, with unhealed ulcers, adherent or unstable terminal scars. Instead of re-amputating a stump, skin and fat frequently is placed over the stump end. In this way a useful joint often is conserved.

Physical Therapy during a Tube Pedicle Migration to the Leg

(1) *Treatment of the injured limb during a tube pedicle migration*—It must be realized that hospitalization in some of these cases of necessity is prolonged, and a patient will not achieve optimum function unless physical therapy is instituted from the beginning and continued throughout this period. Prevention of joint stiffness is its most effective treatment—often the only effective treatment, e.g., with finger joints.



D

During a stay in bed, the quadriceps muscle wastes rapidly and feet muscles easily become lax. Various complications have special indications of treatment, such

as massage and heat to aid circulation and reduce edema, manipulation of joints, remedial exercises to improve muscle tone or galvanic stimulation to artificially effect muscle function. Faradic stimulation sometimes is used in the initial stages of building up a quadriceps muscle.

With fractures of the tibia and fibula, provided the bones are in good alignment and past danger of displacement, the plaster cast is removed for exercises in bed. Free movement improves the circulation. This is important for the eventual "take" of a skin graft or flap. With a cradle over the limb, a patient can keep up joint movements at frequent intervals during the day. After long immobilization, the knee joint often is stiff and at least 120 degrees flexion is necessary for the comfort of a patient with a wrist to leg pedicle attachment.

If a scar disability is associated with nerve injury, complete or partial, and there is loss of function of those muscles supplied by that nerve, the muscles and joints are kept in good condition while the scar is freed and nerve function returns. A plaster cast is worn to prevent deformities.

In amputations below the hip and knee joints, flexion deformities may occur. Exercises are given to stretch the contracted flexor muscles and resistive exercises to the extensor groups. These are continued until an artificial limb is supplied and used.

(2) *Treatment during a pedicle attachment from abdomen to wrist (second stage)*— After operation, the arm is immobilized by elastoplast strapping to the trunk, so that the pedicle is not stretched or kinked. Position of the upper arm is maintained with a slight abduction and internal rotation of the shoulder joint, the elbow joint flexed at 90 degrees and the hand resting on the abdomen. The shoulder, upper arm and elbow rest on a pillow. In this Unit, pedicles usually are made on the same side of the abdomen as the wrist to which they are to be attached. Though initial immobilization thus is made more difficult for the surgeon, the greater range of movement which soon is permitted is of more comfort to the patient.

Some find difficulty in relaxing in restraining positions. Relaxation more easily follows after soothing effleurage twice daily for two or three days. The majority of patients have aches or discomfort at the shoulder and elbow joints for a few days. Deep friction massage twice daily relieves this considerably.

The strapping is removed after the wrist-pedicle suture line has healed, usually about ten days after operation, and movements of the shoulder, elbow and hand are begun within the limits of undue stretching of the pedicle. The new circulation is well established after a fortnight, and there is then no danger if the pedicle kinks during exercises.

The usual movements obtained are:

(a) At the shoulder joint, about 50 per cent range of abduction, extension and flexion and shoulder rollings.

(b) At the elbow joint, a full range of extension. If the pedicle is a short one, the full movement is obtained with side bending of the trunk. Flexion of the elbow joint with flexion of the trunk and a full range of supination and pronation.

(c) At the wrist joint, a full range of all movements.

(3) *Treatment during a pedicle attachment from wrist to leg (third stage)* — After part of a large leg scar is excised, the abdominal end of the pedicle now attached to the wrist is detached and set into the defect. The forearm and hand is strapped with elastoplast to the leg, the knee is flexed and stabilized securely with elastoplast around and around below the knee joint, or a plaster casing over the flexed knee, to prevent knee extension. If the injured leg is a left one, the right wrist is used as the host in the pedicle migration to the leg, and vice versa for the opposite leg. In this way, the body is more evenly balanced and there is less embarrassment of any individual joint mobility, as all movements of the hip are then effective.

If the attachment is from wrist to foot, a plaster mold is worn with dorsiflexion of the ankle joint to prevent stretching of the pedicle. With attachments to foot and lower leg, hip and knee flexions are necessarily increased.

As in the second stage, the muscles and joints ache in their new positions of im-

mobilization. Discomfort usually is more intense in this stage, especially about the flexed knee. Heat sometimes relieves this, but most relief is gained from effleurage and deep friction massage around the knee joint. To minimize discomfort, guarded early movements of the knee joint are given, and in two or three days the elastoplast encircling the knee joint is cut. Holes can be pierced in the strapping and tapes inserted, so that the fixation arrangements can be tied and untied at frequent intervals during the day for knee movements. Care always must be taken to see that the wrist and hand are left well anchored, so that there is no tension or kinking whatsoever on the pedicle.

Later, when the suture line is healed, and the attachment is secure, i.e., about two weeks after attachment, a greater range of movements and exercises is given within the limits of the attachment. These are:

(a) Extension of the knee and hip joints, with trunk flexion (Fig. 2-B). In lower attachments, e.g., wrist to foot, complete knee joint extension usually is not possible, but this depends on the lengths of arms and legs.
(b) Knee flexions (Fig. 2-C).
(c) Flexion of elbow joint with flexion of trunk, and vice versa.
(d) Leg lifting against gravity.
(e) Abduction and adduction of the hip joint.
(f) Hip flexion with extension of the trunk.
(g) Hip internal and external rotations.
(h) Abdominal and buttock contractions.
(i) Foot movements.

(4) *Treatment after detachment (fourth stage)*—If it does not already exist, a full range of knee extension follows in a few days with active movements. An odd case may need faradic stimulation to work up the quadriceps muscle.

In spite of the absence of arm elevation during the second and third stages of the pedicle migration, this usually returns to full function within a week after heat and exercises.

When the flap is healed, general exercises are given in bed prior to weight-bearing. Pressure bandages are worn during weight-bearing for a month or two, until the blood and lymphatic circulations are good, i.e., no blueness or edema of the flap.

Physical therapists must remember that there is no sensation in a flap for many months. They are vulnerable to injury and they burn easily. If they are injured, healing on them is very slow, and every care and advice should be given on that score.

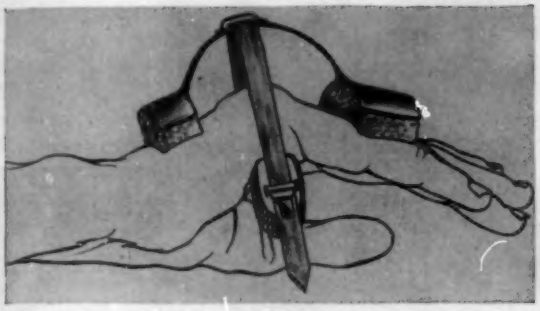
Serial Intermittent Strangulation of a Pedicle End

This is sometimes used to enhance the blood supply at one or other end as required by the next stage of migration, e.g., by cutting off the original circulation from the abdominal end of the pedicle, the vascular hypertrophy from the wrist end is accelerated, which hastens the setting up of independent circulation at this end, sufficient to nourish the whole pedicle length. This especially applies to a long pedicle, or if there is a scarred attachment. For example, with a pedicle attachment abdomen to wrist (second stage), after a fortnight has elapsed, the abdominal attachment of the pedicle's blood supply is temporarily cut off by means of a small Peyers bowel clamp with a thick, soft rubber flex over the blades. The abdominal end is strangled twice daily, usually for two or three minutes, increasing daily to a maximum of 20 minutes. This can be done only provided the pedicle end is well healed (Fig. 2-D).

With the presence of undue fibrosis in a wrist attachment, for example, or along the seam (due to infection, delayed healing or breakdown) the blood flow will be more embarrassed at this end; therefore, the time increase should be more gradual. The same applies to pedicles tense with too much fat, for they are slow in establishing a good blood supply. For stouter pedicles, a rubber band one-half inch wide is used, secured firmly by means of a clip. This is not very satisfactory as the pedicle cannot be clamped at its base. So far, a suitable clamp has not been found. Even if the blades of a clamp will open sufficiently to strangle such a pedicle end, it is of such pressure as to cause damage and hematomas, and this must not be done. Any indications of local damage must be looked for, and the strangling regime ceased forthwith if any are noticed.

The time of strangulation is increased if the pedicle has only a dusky slight blue color throughout its period of strangulation. The circulation is tested by digital pressure prior to strangulation

A



B

C

Figure 3. Splints to apply the principle of continued elastic traction on stiff hand joints. (A) Traction splint for flexion contractions for the interphalangeal and metacarpophalangeal joints. The elastic traction is in the long spring wires. (B) The D splint for metacarpophalangeal joints stiff in extension. (C) The glove with attachment for traction on interphalangeal joints stiff in extension. NOTE: *This is not used unless there is already a flexion range in the metacarpophalangeal joints, or one has been obtained from the use of the D splint.*

and at the end of the period of strangulation before the clamp is released when the return of blood flow will be slower, but the delay should not exceed three seconds.

If the pedicle is whiter than natural skin color, unduly cold, or blue, the strangle should be released immediately.

HAND INJURIES

These warrant a special heading, as almost half of our cases comprise hand wounds requiring plastic procedures for skin, tendon, bone and nerve repair in various combinations.

In all these cases, it is hardly necessary to emphasize the important aim of the best possible functional result, and physical therapy must go "hand in glove" with the surgical management from the outset.

Objects of Physical Therapy Prior to Surgical Repair

(1) It is useless to repair damaged tendon and contracting skin scars if the corresponding joint is hopelessly stiff. All joints, in relation to which repair work is indicated, and which cannot be actively moved, must have a reasonable passive range of movement. With joints already stiff, this often is achieved by a regime of gradual tension by continuous elastic traction arranged from mechanical splints (Fig. 3).

(2) Good local circulation and the minimum of edema must be present. Infra-red therapy, paraffin wax bath and massage are of value.

(3) All remaining function of the whole hand must be maintained by functional exercises.

(4) Any latent infection must be manifest by provocative massage in the soft tissues.

(5) If sepsis is present and fixation in plaster is indicated, it must be ensured that the position of function is maintained. Full respect for this fact can prevent many of the disabilities we see. The optimum position for function is with the wrist dorsiflexed, metacarpophalangeal joints and interphalangeal joints at 45 degrees flexion for all fingers, and the thumb opposed.

Mechanical Splints to Retrieve Mobility in the Small Joints of the Hand

If there is joint stiffness with a flexor contracture, splints are used which enforce gradual tension in extension. The posterior surface of the forearm fits into a mold of metal or some plastic material from which are attached spring wires of medium tension prolonged posteriorly to each finger. The elastic tension is in the wires themselves which can be bent as improvement ensues. A metal ring fits over the second interphalangeal joint and is hooked to the wire, gradually correcting the finger from the contracted flexor position (Fig. 3-A).

In cases of stiff metacarpophalangeal joints, a D-shaped splint with a semicircular spring metal framework produces a two-point pressure on the dorsal surface of the hand, i.e., over the shafts of proximal phalanges and metacarpal bones. The counter pressure is taken against the heads of the metacarpal bones on the palmar surface by a circular wooden rod with a leather strap connected to the apex of the D and fixed by a press clip. Sponge rubber pads prevent pressure marks (Fig. 3-B).

These splints are worn at two-hourly intervals during the day and movements of the fingers are encouraged during off periods. Time and/or tension are reduced if signs of edema or any undue pain are noticed.

Having obtained a range of 75 degrees active or passive movement at the metacarpophalangeal joints, the patient then wears a soft leather glove to further flex the metacarpophalangeal and interphalangeal joints. Rubber traction approximates the hooks at fingertips to the wrist. A light but strong mold inserted beneath the glove keeps the wrist in dorsiflexion (Fig. 3-C).

(1) *Treatment Following Operations for Scar Disabilities:* Small superficial scars on the palmar surface of the hand cause relatively far more disability than they would on a limb, especially if they involve a joint region or a flexure line. Active movements are encouraged early during the healing process of soft tissue hand wounds, and provocative massage is applied after healing for about two weeks. Provided no infection is manifest and the range of movement is embarrassed by the scar to preclude joint stiffness, the scar is excised forthwith and replaced by a Wolfe graft (whole skin). Pressure on these grafts and immobilization are maintained for ten days after operation. A few gentle movements are begun after the second dressing, i.e., usually not before fourteen days. Saline baths at body temperature are helpful in early stages for regaining joint mobility after the temporary immobilization. Hypertonic saline prevents the region becoming too soggy. As soon as healing of the edges is complete, lanoline massage and full range active movements are encouraged, usually within three weeks.

For web scars, e.g., a linear scar preventing abduction of thumb, a Z plastic often is done. As this is a readjustment of flaps only, massage and exercises are begun within two or three weeks.

(2) *Treatment Following Operations on Tendons:* Repair of divided tendons or freeing of adherent tendons often is done in conjunction with local plastic operations on associated scars. Repaired or freed tendons frequently are wrapped in fat at operations to prevent secondary fixation. Successful tendon repair operations require that the joints are in good condition and joints must be kept free by passive movements, pending operations.

(a) *After repairs of long extensor and flexor tendons,* the muscles are reeducated in the inner range after three weeks immobilization. The range of movement gradually is increased to a full range with slight resistance by the end of the fifth week. In the fourth week, the plaster mold is removed for intermittent periods during the day. For the fifth week it is worn at night only and at the end of that week it is removed altogether. These cases usually are sent to a Convalescent Depot for more intensive physical therapy and occupational therapy.

(b) *After tendon grafts,* complete immobilization is maintained for three weeks in the optimum position of function and muscle reeducation, then commenced in the inner range. Friction massage helps prevent formation of adhesions at graft or operation areas.

The plaster mold is continued for five weeks, except during twice daily treatment, and the time of immobilization is gradually diminished until the end of the sixth week when it is discarded. If there is no satisfactory movement in six weeks in a flexor tendon graft, the flexed posture of the position of function is maintained, so that there is always at least the improvement of a stiff finger in a better position of function.

In the case of the long extensor tendons, the wrist and fingers as far as the first interphalangeal joints are immobilized in a plaster mold. Normal hand movements, with consequent passive stretching of the tendons, are encouraged after the sixth week.

(c) *After tendon transplants,* immobilization is continued for three weeks in the position of rest for the muscles concerned. In the fourth week, assisted active movements are begun. The plaster mold is worn at nights only in the fifth week, and removed altogether at the end of the sixth week. Increasing strength of the range is obtained by resisted exercises.

Finally, after all tendon operations, more intensive physical therapy with combined general

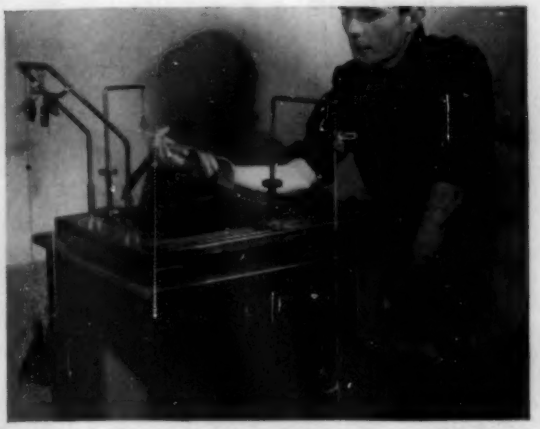


Figure 4. Hand exercising apparatus used in the Department. By adjusting the inclined plane, weight traction in various directions can be applied to exercise fingers weak and stiff with various deformities. It is used as a routine with benefit following many hand injuries.

hand movements by means of occupational therapy is practiced and patients are taught and encouraged to proceed with these exercises themselves.

To increase the strength of individual muscles of the hand after various reparative operations, we use to great advantage an apparatus with pulleys of varying weights of sand or gunshot as seen in Figure 4. The patient exercises on this apparatus for intermittent periods during his stay in hospital. The frequency and the weight can be increased according to how much function the muscle will take before tiring.

The "Through and Through" Type of Hand Wound

These are usually gunshot wounds and present special problems of treatment. When they ultimately reach a plastic surgery unit from the war zone, the small dorsal exit wound often is unhealed, and there may be bone sepsis and sequestration following compound fracture of metacarpal bones. The extensor tendon usually is or becomes involved in scar; it may or may not be severed. Joint mobility is encouraged by movement in a saline bath, but it usually is impossible to keep the metacarpal joint free if at this stage it is not already stiff, for all attempts at flexion usually are from the ununited fracture line.

The combination of an ununited metacarpal bone, often with bone loss, and a stiff metacarpal joint, have been noticed time and time again following these injuries.

On examination when healed, the typical position is a finger hyperextended by the contraction of a dorsal scar, and the scar adherent to extensor tendons. If the extensor tendon is severed, the ends will be tied down in scar and often to bone callus as well. It is impossible at this stage to tell if these tendons are actually divided or merely adherent in scar. The head of the metacarpal bone is usually retracted proximally, so that the finger is shorter than normal, and the metacarpal head makes a visible prominence in the palm, with a flat hand deformity.

After local rearrangements of the scarred areas, with tendon freeing or suture, active exercises are supervised after the appropriate period of immobilization—a few days in cases of tenolysis and three weeks in cases of tendon repair. In some cases, at a later date bone has been grafted between the ununited ends and lateral capsulotomy of the metacarpal joints done at a later operation.

The "Hand Grenade" Type of Hand Wound

Hands injured in this way usually demonstrate extensive soft tissue injury and varying degrees of finger loss. As early as possible, active movements are encouraged to keep the remaining joints mobile. These are done in a saline bath during treatment relative to the soft tissue injury. Tendons relative to the finger joints remaining in these hand mutilations usually are intact. It will be found that the joints are surprisingly mobile at first, but as scar tissue forms, less and less movement is obtained.

For two or three weeks after healing—which may be accomplished by palliative skin grafts—provocative massage is given. Wolfe grafts then are used to replace the scars which are excised.

It may be necessary to improve the function of such hands by lengthening the thumb stump by soft tissue and bone grafting. In such cases, a better function is obtained if the carpometacarpal joint is present and functioning.

If the thumb stump is of sufficient length to provide an anchorage, the thenar muscles are exercised actively and with resistance by means of pulleys and weights on the hand exercising apparatus. Raising of an abdominal pedicle forms the first stage. At the second stage, the thumb remnant is attached to one end of the pedicle. Active exercises are kept up during these stages. At the third stage, the pedicle is detached from the abdomen, and the thumb remnant with soft tissue prolongation is held in a light plaster cast. The local peripheral circulation takes some time to establish itself fully at this stage and when the suture line is healed, massage and exercises are given to improve this. Warm cotton-wool is wrapped around the part inside a vulcanite splint made longer than the thumb and left open at the

top. This protects the soft tissue prolongation and holds it in correct position.

When the peripheral circulation is adequate, usually about two to three months after detachment from the abdomen, bone is grafted to extend up the core of the pedicle, and the new thumb again is immobilized. When the bone graft is firmly united, active and resisted exercises are started and normal use of the hand is allowed as nearly as possible to build up the muscles to the required efficiency.

From unthrown hand grenade injuries, we have seen all the fingers gone, leaving stumps at varying levels. Provided the thenar muscles are intact, not only can the thumb stump be lengthened, but another stump can be made from the same pedicle to make an apposition part which enables the reconstructed hand to grip objects.

Capsulotomy of Metacarpophalangeal Joints

Where metacarpal fractures have been slow in uniting with a prolonged period of immobilization, the metacarpal joints often become stiff, as they may from long immobilization for any reason. Stiff fingers, hyperextended at the metacarpal joint and a flat hand (loss of arch) deformity, is a condition always to be avoided by maintaining the correct position of rest where possible when immobilization is required. It is usually futile attempting to regain flexion of these parts by continuous traction or by forced movements. The lateral ligaments of the capsule which are attached in their slack portion are cut, followed by flexion of the joint and splinting in the maximum flexion obtained. Some of these results have been dramatic. Plaster is removed the next day to give passive movements twice daily to maintain the new range. Active movements are started as soon as possible. The period in plaster is lessened each day, provided the range is maintained, with increasing activity.

DUPUYTREN'S CONTRACTURE

Though not a war injury, we see a large number of cases of this condition in service personnel, so a few pertinent remarks follow.

It seems that better results are obtained in the treatment of this condition if fasciectomy is done early, i.e., before the finger contracts towards the palm and joint changes set in. Our cases range with a history from two to fifteen years duration. The ring and little fingers are the ones usually involved in the disability, although we have had flexion contraction of all the other fingers.

In a longstanding case, the ring or little finger usually touches the palm with the other not far behind. The first interphalangeal joint often is thickened. After fasciectomy, the fingers are splinted in as full an extension as possible. Gentle active movements are encouraged when the stitches are removed. If a Wolfe graft has been necessary in the operation, movements are begun two weeks after operation, and when the edge suture line is secure, gentle lanoline massage is started. Passive stretching of the parts, if done too early, sets up a "thickening" reaction in the tissues. Massage aids considerably in resolving the area and maintaining freedom of the tendons. It also prevents adherence to the new scar. Wax baths are used in cases with residual joint disabilities. Severe or longstanding cases wear a splint at night for six weeks. After operation, in most longstanding cases, only a 50 per cent range of extension is achieved at the first interphalangeal joint, because of joint changes; but the metacarpal joint usually regains a full range. Results in early cases generally are excellent, and the functional result obtained even in gross cases surpasses that of amputation.

BURNS OF THE HAND

Most of the burned hands we see have been caused by burning aircraft and petrol explosions (Fig. 5-A), the dorsum of the wrist, hand and fingers being most commonly involved. After a few days, when shock is well controlled or subsided, active movements are encouraged daily in saline baths. In a few days, with a second degree burn (i.e., with only incomplete skin loss), the fingertips usually can touch the palm; but this range diminishes as scar tissue forms on the dorsum.

If the skin loss has not been as complete as at first seemed apparent, areas of epithelialization become obvious among the burned areas. To prevent stretching and traumatizing of the newly-formed scar tissue, full range joint movements are obtained in the first and second interphalangeal joints by holding the finger in extension and the metacarpophalangeal joints flex with the interphalangeal joints held in extension.

Volar and dorsal light plaster casts are worn over the dressings and pressure bandages to maintain the hand in the position of function. The volar plaster is made first with a slight dorsiflexion at the wrist and ending below the heads of the metacarpal bones. The dorsal plaster is made with the volar plaster "in situ" to obtain the correct wrist contour. The dorsal plaster forms a cage over the wrist, dorsum of hand, fingers and thumb and holds them in the correct position of function.

Later, when pain is less and freedom of movement is easier, very narrow pressure bandages

Figure 5. Extensive mixed second and third degree burns of the hand. (A) Typical distribution of raw areas of third degree burns on the dorsum of an airman's hands after a plane crash. (B) Maximum range of flexion in the fingers obtained after the areas had healed by scar and palliative pinch grafts. (C) Improved flexion range of fingers after the scarred areas on the dorsum of the hand had been replaced by dermatome grafts. The right hand does not show the final result as he has since had further operative treatment.

are applied spirally to encircle each finger, and movement is encouraged. Plasters are worn only at night.

Early healing is important to prevent deep scarring, and pinch grafts are used freely as a palliative to effect healing of remaining small unhealed areas (Fig. 5-B). When the area is healed, lanoline is massaged into the scarred areas to prevent excessive dryness and cracking of the thin papery skin and scar. Joints are kept mobile with only active movements. It must be remembered that forced movements stretch scar tissues and increase the fibrosis in it. Thick fibrotic bands will soon form in the direction of pull of finger movements, particularly along the webs of the thumb and the fingers, and along the lateral and dorsal surfaces of the fingers. As soon as the patients are fit for reparative operations (they may require a long convalescent holiday), large dermatome grafts are used to replace scar tissue on the wrist, the dorsum of the hand and thumb and in the webs of thumb and fingers. This usually leads to a regaining of good function (Fig. 5-C). For smaller areas, and particularly in the palm, whole skin (Wolfe) grafts are used.

Illustration: Case 3—Compound forearm injury, pedicle flap, tendon transplants and bone graft.

A

B

Figure 6. Compound injury of forearm and hand—abdominal flap, bone graft and tendon transplants (Case No. 3). (A) Functional results of maximum flexion and maximum extension after a gunshot wound of the forearm with a large scar adherent on the dorsum of the forearm and with extensor muscle and tendon loss. (B) Excellent functional result obtained after scar excision and replacement by an abdominal flap on the dorsum of the wrist and forearm, a bone graft to the ulna and tendon transplants.

7/20/42: A soldier at El Alamein sustained a mortar shrapnel wound of the R forearm, resulting in compound fracture of the radius and ulna, and extensive destruction of the long extensor muscles of the wrist and fingers.

2/2/43: After return to Australia, he then had an atrophic healed scar in middorsum of the forearm 3" x 3", adherent firmly to deep structures, with obvious muscle loss and irregular contour. X-ray showed a destruction of the radius and ulna at junction of middle and lower thirds, some bony deficiency of the radius and ulna with some bony union across the fracture site of the radius. Comminution of ulna with no union. General alignment was good, and there were metallic dust and FB's about the site.

Function: The extension of the elbow joint was limited by 60 degrees. Supination not beyond midprone; pronation slightly limited. There was no active movement of wrist extension. Attempt to extend by means of extension of the fingers with the interossei muscles. There was active finger flexion in all joints, but (a) limited to 50 per cent range because of the scar tension on the dorsum of the forearm, and (b) weak movement because of inadequate anchorage of muscles on the ununited bones. The interossei and lumbricales muscles showed strong function. In the thumb, there was no active extension of metacarpophalangeal or interphalangeal joints. There was no evidence of nerve injury.

2/25/43: Prior to the raising of an abdominal tube pedicle 6" in length (a) the wrist was fixed in dorsiflexion on a plaster mold between treatments; (b) fingers were not immobilized so as to induce movements; (c) all joints were kept mobile by daily passive movements, and (d) combined active hand exercises were encouraged in the hand class. At this time, there were so many hand cases in the wards that individual attention could be given only in part. However, the necessity proved of great value in promoting a good team spirit of cooperation.

3/24/43: The upper end of the abdominal pedicle was detached from the abdomen.

4/21/43: After excision of the scar, the pedicle was spread over the forearm as a flap. At this operation, the distal end of the extensor communis tendon was sutured to the scar band of the remainder of the muscle to help stabilize the wrist with a view to tendon transplants at a later date. Extensor carpi radialis longus and brevis muscles were the only intact muscles in the dorsal forearm and these were encased in scar. Immobilization in a plaster mold with dorsiflexion of the wrist and extension of the metacarpophalangeal joints, i.e., the mold supported the proximal phalanges and was maintained for three weeks.

5/9/43: Active exercise showed a slight improvement of extension of the fingers at the metacarpophalangeal joint. The wrist was stabilized in a neutral position.

6/25/43: *Operation:* Tendon transplants—The extensor carpi ulnaris was separated from its insertion and sutured to the distal healthy segment of the extensor communis tendon. The extensor carpi radialis brevis was cut from its insertion and was sutured to the distal end of the extensor pollicus longus tendon. Immobilization was maintained by a volar plaster for three weeks with the wrist in dorsiflexion and the thumb in extension.

7/17/43: While still in plaster, massage was given to soften the scar and aid circulation and assisted active extension movements to the wrist and thumb. There was evidence of weak contraction of the extensions of fingers and thumb, working simultaneously with dorsiflexion of the wrist. The strength of these movements improved over a period of five

weeks with physical therapy and later with occupational therapy.

11/24/43: *Review:* (a) The new wrist and thumb extensors were functioning strongly. (b) The flexion of fingers had improved in range. The fingertips could not touch the palm, but the range was sufficient for general use. (c) The strength of the grip was only 50 per cent due to instability of the ununited ulna.

1/13/44: He was readmitted for a bone graft to the ulna at the fracture site between mid and lower thirds. Cancellous bone chips from the iliac crest were used and the arm immobilized in plaster with the elbow joint at 90 degrees flexion at mid prone, wrist in dorsiflexion and the fingers and thumb in extension to the first interphalangeal joints. The proximal phalanges were supported to aid healing of the soft tissues and rest the extensor tendons.

1/28/44: The plaster was trimmed down to leave only a wrist support. A light "Cellona" mold was made to separately support the fingers and thumb. This was removed at periods during the day for exercises. Edema of the fingers subsided with the aid of effleurage. It was six weeks before the extensor tendons were of sufficient strength to discard the "Cellona" mold entirely.

4/21/44: He was discharged with union of the ulna well advanced.

5/24/44: *Review:* There was excellent extension of wrist and fingers; the muscle bellies had hypertrophied beyond imagination in the time, and the grip was much stronger (Fig. 6-A and B).

Illustration: Case No. 4—Compound hand injury—abdominal flap, tendon grafts, capsulotomy.

12/24/42: A soldier in New Guinea sustained a machine gun bullet wound of the L hand, resulting in compound fractures of the first, second, third, fourth and fifth metacarpals, and fractures of the carpal bones—navicular, capitate and triquetrum.

2/7/43: Admitted to this Unit with hand and forearm in a splint with wrist and fingers in extension. The plaster was removed for examination which showed—(a) open granulating dirty wound 2″ wide across the dorsum of the hand; (b) the whole hand very edematous and boggy with soft tissue infection, and (c) only a few degrees of active flexion range in the interphalangeal joints and no active extension. As there was evidence of spreading soft tissue infection, the hand and fingers were immobilized in a volar plaster mold. He had daily saline baths before dressing of the large wound, but *no* movements.

2/19/43: Infection had subsided. The volar plaster mold was remade to free the metacarpophalangeal joints and fix the thumb better in opposition. Active exercises were given in the saline bath each day.

4/16/43: The wound was now well healed (Fig. 7-A) and FB's and small pieces of wood had been removed at minor operations. A traction splint was made to control and increase wrist dorsiflexion, correct the radial deviation and improve the thumb opposition (Fig. 7-C). There were reasonably good active and passive movements in the interphalangeal joints. The few degrees flexion was obtained not at the metacarpophalangeal joints but at the ununited fracture line. The thumb could just oppose to the tip of the ring finger.

5/17/43: *Operation:* The middorsal scar was excised and an abdominal flap raised with both ends attached to the abdomen. The hand was placed beneath the flap in "hand-in-pocket" method. Although active movements were encouraged to the finger joints while in this position, very little could be obtained from the extended hand resting against the abdomen.

6/10/43: The flap was detached from the abdomen and set into the hand at each end.

6/25/43: The flap was healed. The wrist was stiff and showed marked ulnar deviation. Since the flap had been detached from the abdomen, the wrist had been immobilized in plaster. The thumb opposed only to the index finger, and there was only a few degrees range of movement at the interphalangeal joints.

7/19/43: By extensive active and passive movements with particular attention to thumb opposition, the hand improved over three weeks, but it was not as good as before the period of immobilization on the abdomen. The special splint again was worn to correct the wrist and thumb oppositions.

There was now slight dorsiflexion at the wrist joint (as much as could be obtained in view of the carpal bone fractures). The deformity of ulnar deviation was not so marked. There was an almost full range at the interphalangeal joints actively and passively, but absolutely no active or passive movement of the metacarpophalangeal joints of the middle or ring fingers, though a few degrees of metacarpophalangeal flexion in the index and little fingers. The thumb opposed to the tip of the mid finger. The absence of active extension of the index, mid and ring fingers at the metacarpophalangeal joints obviously was due to destruction of the extensor digitorum communis tendons. The action of the lumbricales and interossei muscles in the middle and ring fingers was doubtful. The interphalangeal joints rapidly stiffened if not continually moved. Occupational therapy was ordered to remedy this.

8/13/43: Temporarily discharged.

1/8/44: Readmitted for review. Function of the hand remained the same but fortunately, over a period of time, the interphalangeal joints had lost their tendency to stiffen up. X-ray showed ununited fractures of the index metacarpal bone, with the head displaced to the ulnar side, fractures of the third and fourth metacarpals with some ulnar displacement of distal halves and marked shortening, a fracture of the fifth metacarpal with ulna bowing of the shaft, ankylosis of all the carpal bones, and arthritic changes about the carpometacarpal joint of the thumb.

1/10/44: *Operation:* The lateral ligaments and dorsal capsules of the metacarpophalangeal joint of

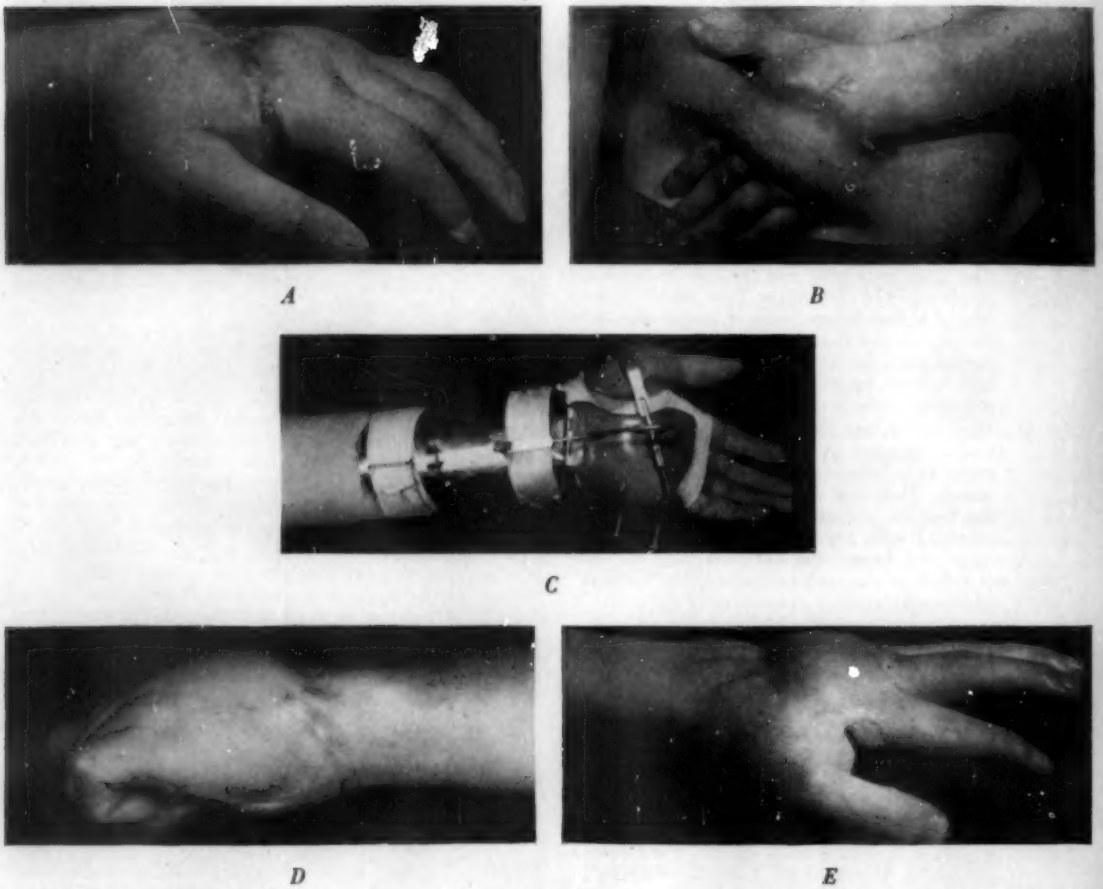


Figure 7. Compound injury of the hand with skin, tendon and bone loss (Case No. 4). (A) Healed wound across the dorsum with dense scar between nonunited metacarpals and with large gaps in the extensor tendons to the middle and ring fingers. Note the bad position of the thumb metacarpal. (B) Flap used to make good the soft tissue loss preparatory to tendon graft. (C) Specially designed traction splint to improve ulnar deviation of the hand and the bad thumb position. (D) Flexion range of the metacarpophalangeal joints obtained in the middle and ring fingers following capsulotomy. These fingers were previously stiff in extension. (E) Good active extension obtained in the middle and ring fingers after tendon grafts.

the mid and ring fingers were divided. Joints mobilized and fixed in plaster with 80 degrees flexion. Index and little fingers fixed likewise in 40 degrees flexion.

1/21/44: A passive range of movement was carried out daily to the maximum of flexion as retained by the plaster. This range was well maintained and it was considered worth doing extensor tendon grafts. As with passive flexion of the metacarpophalangeal joints, there was no active range; it was obvious the lumbricales-interossei muscles of these two fingers were not functioning. Whether the muscles themselves or the nerve supply to them had been damaged or whether there was insufficient anchorage for the muscles on the ununited metacarpal bones was open to speculation.

2/10/44: *Operation:* A 3″ tendon graft for the gap in the extensor communis tendons of the mid and ring fingers was arranged beneath the dorsal flap in the hand. The plantaris tendons from the leg were used. The metacarpophalangeal joints were flexed a few degrees and this position maintained by plaster.

2/25/44: As the metacarpophalangeal joints apparently had not stiffened, the plaster was changed to hold the fingers in extension and assisted active movements of finger extension were given daily at this stage.

3/3/44: The metacarpophalangeal joints again were stiffening. A passive range of flexion was guardedly given with no ill effects to the extensor tendon grafts now apparently functioning.

Five weeks after the tendon grafts, the extensor tendons could take fair resistance through a range of 45 degrees. The passive range of metacarpophalangeal joint function was greater than before capsulotomy but not

as much as prior to the tendon graft. There had been some fixation of the metacarpophalangeal joints during the period of immobilization by 25 degrees.

Three months later, the hand again was reviewed. It showed greater extensor tendon strength, but the range of joint movement was the same as on discharge.

Remarks: As can be seen, the "hand-in-pocket" flap was most unsuitable to this case, in view of the embarrassment caused to the joint mobility. A very similar case since has had a direct abdominal flap, attached only on one margin, with a plaster maintaining the wrist in dorsiflexion throughout the attachment. This worked well.

Although the usual practice is to immobilize grafts to extensor tendons for three weeks, owing to circumstances in this case the fingers were moved at two weeks with a working tendon at three weeks.

The difficulties of treatment of a hand such as this case, and the limitations of the result observed by a most active and costly programme, again emphasize the importance of early fixation of a hand in the true position of function. The patient then would have had a much better result from such a hand injury, and a shorter stay in hospital (Fig. 7-A, B, C, D and E).

GUNSHOT WOUNDS OF THE FACE

These produce all degrees of injury and mutilation of the various soft and/or bony tissues. A scar which may be considered small on a limb is a large one on a face, and it is most important to a patient's psychological outlook to have a socially presentable countenance. The handling and reconstruction of these cases of face mutilation is therefore most meticulous, aiming at invisible face scars, symmetry and mobility of the face structures.

It is essential to have final skin scars mobile on underlying structures. Friction massage often is not sufficient to this end, as the scars readily adhere to the small muscles which lie so closely under the skin, and even if the scar does not interfere with function, the blemish remains. Thus more face scars are subject to operation. After excision of the scar, a well placed and well made secondary suture line may be all that is necessary and lanoline friction massage aids in softening and fading it. After the replacement of face scars by Wolfe grafts, lanoline massage over and about the graft is given, and the patient instructed to do this himself. Functional exercises of the forehead muscles are specially encouraged early as these muscles become very lazy with the tightness of a local graft or operation scar. Muscle function will itself aid graft mobility.

Facial Nerve Lesions

In gunshot wounds involving the facial nerve, the muscles usually require treatment through all the stages of any reconstruction. Electrical reactions are done early as a guide to the state of the nerve, and as a basis regarding future progress. A monthly record is made.

Most of the cases of gross face injury which come to us show partial or incomplete lesions of the facial nerve, but they rapidly recover or improve. In all cases massage is beneficial provided that the paralyzed muscles are not stretched or dragged during the process. To prevent sagging of the upper lip and about the mouth, an acrylic splint is worn attached to the teeth or a denture. Galvanic stimulation is helpful to maintain the healthy state of paralyzed muscles, but it is contraindicated if there is any faradic response or voluntary movements.

As soon as a patient can see his own muscles working, apart from daily treatment by the physical therapist, he does his exercises in front of a mirror a few times during the day. In the early stages, the muscles will be very weak, so that the patient is taught to assist his muscles with two or three fingers in the direction of the muscle pull, and from the outset, the muscles on the normal side are taught to relax. To cease treatment before the muscles have had a chance to tire also is stressed; otherwise, progress can be delayed.

If the reaction of degeneration seems obvious or inevitable, the nerve is explored with a view to repair or nerve anostomosis, or fascial slings to the paralyzed side are considered according to the special indications.

Illustration: Case No. 5—Compound face mutilation—facial paralysis and nerve anostomosis.

While in the Middle East, this patient sustained a gross gunshot wound of the lips, tongue and palate with L facial paralysis.

3/7/43: He arrived in Australia at this Unit. An extra-oral lip prosthesis to prevent lip deformity was attached to a plaster headcap. All muscles supplied by the facial nerve showed slow sluggish reaction to the galvanic current.

4/8/43: The splint to the lip was removed to take an impression for a denture obturator. Electric reactions were taken again, but there was no change on the previous findings.

4/29/44: The extra-oral lip prosthesis was now fitted to the denture and the headgear was discarded. He was under treatment for other lesions.

7/13/44: *Operation:* The facial nerve was found to be divided at the stylomastoid foramin. The hypoglossal nerve was found and freed with difficulty on account of fibrosis from previous

operation in the neck. This was divided and its distal end brought up external to the digastric muscle and united to the distal stump of the facial nerve. Union was made without any tension on the nerves.

7/27/43: Galvanic stimulation treatment again was started. A month later he went to the Convalescent Home and reported for physical therapy once a week.

1/22/44: A weak contraction was noticed in the elevation of the angle of the upper lip and portion of the orbicularis oculi muscle. These functioned only with tongue movement.

1/2/44: Discharged from hospital with strong voluntary contraction of all muscles of the L side of the face except no return of function in the frontalis muscle. The muscles functioned as a mass movement (Fig. 8-A and B).

or reactionary nature, where there is an obvious or smouldering inflammatory condition, and any physical therapy would lead to a delay in resolution and even increase fibrosis, making a permanent trismus of what in time would normally resolve with passive treatment. Heat may be of help in such cases, but massage, exercises or a trismus apparatus as would be indicated for trismus of a mechanical origin are contraindicated where there is any suspicion of inflammation.

After some fractures in the temporomandibular joints, often followed by imperfect anatomical union, there may be not only residual trismus but deviation of the jaw to one side on opening or some irregularity of the bite. In these cases, re-

Figure 8. Gunshot wound of the face, with facial paralysis treated by nerve anostomosis. (A) Complete left side facial paralysis. The eyelids are adherent by tarsorrhaphy done for gross eye exposure and corneal changes. The lip position was controlled by a splint at the corner of the mouth on the teeth, portion of which is outlined. (B) Condition of the face following regeneration after hypoglossal facial nerve anostomosis.

After immobilization for fractures of the mandible and maxilla, normal efforts usually are sufficient to regain function. In some cases with marked trismus—usually after more prolonged immobilization, especially if there has been injury to the joint regions—spasm is lessened by promoting a better circulation with heat and massage. The patient himself inserts a wedge of wood between his teeth and works it in a rotatory action. Overforced stretching only increases spasm. We try to hasten increase of the range of movement until the patient can insert two of his own fingers side on between the upper and lower teeth, and until the R and L lateral movements of the swing of the mandible are equal and to the width of the crown of a lower incisor tooth.

Physical therapy indiscriminately applied to trismus without respect to its origin is ill-considered. In some cases, trismus is of a protective

education and exercises have some place in compensation and correction of the bite. Condylectomies occasionally are done for injuries in this region, which do not do well with conservative treatment. After these operations, a routine of increasingly active exercises is started after a short period of immobilization following operation. These exercises are done to compensate or reaccommodate the bite and to prevent secondary deformities which may follow the removal of one or other, or sometimes even both, condyles.

In these varied considerations, an endeavor has been made to show how the physical therapist in a Plastic Surgery Unit must fit her work in with the general program of management entailed in plastic reconstruction. It is obvious that she must understand what is being done, in what way she can help to achieve the object of treatment, and, moreover, the pitfalls in her own

work on such cases, ignorance of which might lead not only to a nullifying of her own efforts, but to catastrophe in the whole plan of management. She must, moreover, by her own example of confidence in herself, engender the same in the patients she has to manage, for complete confidence in what is being done for them is essential to effect the end results which can be obtained.

William Gilbert, The Father of Electrotherapy

By Frank Hammond Krusen

The Dictionary of National Biography records that Gilbert's "De Magnete" was the first great physical book published in England. His general conclusion is that the phenomena of magnetism are explained by regarding the earth as one vast spherical magnet.

His book is devoted chiefly to magnetism, but in Chapter II he describes a large number of phenomena somewhat resembling those which are magnetic. He showed that by the friction of glass, wax, sulphur, and many other substances besides amber an attractive power could be produced. To this power he gave the name "electricity" (electricitas) from the Greek name for amber. To Gilbert, therefore, we owe the word "electricity." In this marvelous book he laid the foundation of terrestrial magnetism and electrical science.

While the greater portion of "De Magnete" is devoted to magnetism, nevertheless, a very important section deals at length with electricity. Gilbert's experimental discoveries in electricity may be summarized as follows:

1. The generalization of the Class of Electrics.
2. The observation that damp weather hinders electrification.
3. The generalization that electrified bodies attract everything, including even metals, water and oil.
4. The invention of the non-magnetic *versorium* or electroscope.
5. The observation that merely warming amber does not electrify it.
6. The recognition of definite class of *non-electrics*.
7. The observation that certain electrics do not attract if roasted or burnt.
8. That certain electrics when softened by heat lose their power.
9. That the electric effluvia are stopped by the interposition of a sheet of paper or piece of linen, or by moist air blown from the mouth.
10. That glowing bodies, such as live coal, brought near excited amber discharge its power.
11. That the heat of the sun, even when concentrated by a burning mirror, confers no vigor on the amber, but dissipates the effluvia.
12. That sulphur and shellac when aflame are not electric.
13. That polish is not essential for an electric.
14. That the electrics attract bodies themselves, not the intervening air.
15. That flame is not attracted.
16. That flame destroys the electrical effluvia.
17. That during South winds and in damp weather, glass and crystal, which collect moisture on their surface, are electrically more interfered with than amber, jet and sulphur, which do not so easily take up moisture on their surfaces.
18. That pure oil does not hinder production of electrification or exercise of attraction.
19. That smoke is electrically attracted unless too rare.
20. That the attraction by an electric is in a straight line toward it.

In Book I, Chapter XV, he discusses "The Medicinal Virtue of Iron" in part as follows: "It is given chiefly in cases of laxity and over-humidity of the liver, in enlargement of the spleen, after the evacuations, for which reason it restores young girls when pallid, sickly and lacking color to health and beauty." He gives a splendid description of the therapeutics of iron, which could be little improved upon today.

After publishing his monumental work, Gilbert did not live long to enjoy the honors that were showered upon him by his fellow scientists.

As "chief physician" to Queen Elizabeth, he was probably one of the group of "ten or twelve physicians that were continually about her" when, overcome with remorse over the execution of the Earl of Essex, she developed mental symptoms, and lay upon cushions on the floor for four days. Despite her physician's entreaties, she refused all food and medicine, and finally succumbed.

Eight months later, Gilbert, who had in the meantime been appointed physician to King James I, followed his Queen in death. He was sixty-three years old when he died, on November 30, 1603. — *From "Archives of Physical Therapy," December 1931.*

The Physical Therapy Prescription

Jessie Wright, M.D.

Physical therapy should be prescribed with the same thought and precision as when selecting and dosing drugs. Much misconception and confusion have arisen in the past because physical treatment has not been prescribed according to age, individual tolerance, and general or local pathologic changes. Too often physical therapy is prescribed when it is contraindicated or not specifically needed, resulting in the treatment falling into disrepute. In other instances spectacular cures are attributed to treatment by physical measures when perhaps the progress had reached a place when improvement could be expected anyway; in this manner physicians and patients are led to expect too much from such therapy. If used when indicated and transitions in treatment keep pace with the changes in pathology, then a scientific rational system may be followed and reasonable results anticipated.

In prescribing physical therapy for any type of medical or surgical patient for whom it is indicated, it is well to consider all possible methods in a regular order, always giving preference to the simplest measures which will accomplish the purpose. One bears in mind the subdivisions of physical therapy in the order of practical usefulness. These include physiologic relaxation; massage; exercise; manipulation; various forms of heat included under thermotherapy; cryotherapy; hydrotherapy; light or phototherapy; electrotherapy; and mechanotherapy (including use of stall bars, rings, wands, spirometers, respirators, alternate suction-pressure devices, intermittent venous occlusion machines and other therapeutic apparatus). Before choosing one or more of these forms of therapy, one should consider carefully the age and tolerance, as well as general and local variations from normal. Then the dosage is planned on a graduated constructive schedule in a way best suited to the individual case.

In discussing the physical therapy prescription obviously all prescriptions and combinations of methods cannot be summarized in a short outline. I shall try to emphasize the principles on which any form of physical therapy may be prescribed. If basic facts are understood, the choice for each specific indication will be apparent.

Before attempting any physical treatment, one should be certain that the patient is properly relaxed. Tense muscle or residual neuromuscular hypertension compresses venous and lymphatic channels for abnormally long periods so that the elimination of waste products is impeded and fresh circulation and nutrition are largely withheld. Some individuals truly do not know how to relax. This may be the physiologic basis for lowered resistance to certain pathologic states. Many of the phenomena of nervous or residual neuromuscular hypertension are reflex reactions to anxiety, discomfort, pain, or high-pressure work and may be demonstrated by such physical signs as wrinkling of the forehead; restless movements of the eyes, nose, mouth, head, neck, hands, and feet; clearing the throat without need; jumping at an unexpected noise; irregularity of time or force of respirations; spasm of the alimentary tract sphincters sometimes with associated disorders of digestion and elimination. All muscles normally have a state of tonus or readiness to respond, even when the body is at rest. Neuromuscular hypertension refers to an exaggeration of the normal which makes it impossible for the patient to relax physiologically because of an overcharged state of the neuromuscular mechanism. Certain patients, with cold hands and feet, hypersensitive muscles, nerves, or joints, vague digestive disturbances, and headaches for which no cause has been found and which medical treatment has not helped, may be found, on further study, to be suffering from residual neuromuscular hypertension. The most effective prescription may be progressive scientific relaxation. The patient is taught to recognize the abnormal tension by actively exaggerating it; then progressive relaxation is taught by a definite sequence in favorable surroundings in-

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cluding a quiet, shaded room with instruction given in a slow, rhythmic, low-pitched voice. I give patients a mimeographed outline of procedures. The idea is then carried into the patient's daily routine as an ability to practice differential relaxation, using only the muscles needed for each purpose. (Trained athletes give an impression of grace and ease by relaxing muscles not involved in actual performance.) Massage is waste of time if the patient holds the part so stiff that the contracted, tense muscle tends to compress the circulatory channels. The physician who understands this principle will order attention to relaxation before any physical treatment is carried out.

Perhaps the easiest way to indicate how transitions in treatment should keep pace with changes in pathology is to give a few clinical illustrations. Let us suppose that a cast has been removed from a healed leg in which a fracture has been present below the knee joint. The foot and leg to the hip have been included in the cast. During the interval taken for the bone to heal after being aligned, the muscles atrophy, blood supply is diminished, lymphatic spaces are compressed in the snug fitting cast, excess callus has formed around the fracture, and joints have become somewhat stiff from therapeutic limitation of motion. When the surgeon feels that it is safe to gradually remove the support and start physical therapy, the cast is bivalved, one-half being removed at a time so that there is no undue strain or pain in involved areas and so that the injured area is supported by the front half of the cast while the back of the leg is being treated, and the other half of the cast used during exposure of the front of the leg, the whole cast being in place when the patient is turned. This gradual removal of the cast not only protects involved parts but also prevents sudden swelling from overfilling of lymphatics in the tissues which have been accustomed to the support from the cast. In this stage, heat and massage are indicated to improve the circulation to the included areas and to dilate compressed lymphatics and capillaries. Since heat tends to cause local edema by dilating lymphatic and capillary beds, it should be followed by contrast applications or massage, the direction of firm movements being in the direction of flow in the afferent systems, that is, in the venous and lymphatic vessels. First the muscles are massaged and then the joints, followed by careful friction around the area of ensheathing callus. The procedure is ended by stroking. When the circulation and muscle tone have improved to a point where gradual movements may be started, guarded active assisted movements are safer and more effective than passive motion. Since the active muscular contraction exerts a pumping action which facilitates the elimination of waste products from the muscles and related tissues, during the period of relaxation fresh blood supply may more readily fill the channels, bringing an improved cycle for delivering fresh materials for metabolic processes. The tension exerted on the capsules of the joints during active movement stimulates the synovial membrane lining the joints to provide better lubrication. When improvement has progressed to the point that the cast is discarded entirely and the leg is being lowered from the horizontal plane to the vertical, there will be an added tendency to swell until the vascular channels have adapted themselves again to holding the fluid volume against gravity. At this time the prescription should be changed from heat and massage to alternate hot and cold contrast baths or sprays followed by massage and active exercise. The hot water dilates superficial capillaries and relaxes the smooth muscle in the deep layers of the skin, while the cold contrast application causes contraction of the smooth muscle with constriction of capillaries in the skin network. This sets up a cycle to keep the circulation moving and tends to prevent overfilling of veins and lymphatics. Too often baking and massage are prescribed early and used throughout convalescence beyond the time when there is a desirable physiologic response. Prolonged use of heat without making a transition to contrast applications leads to passive congestion followed by chronic swelling and thickening. Exercise should begin when the cast is bivalved as muscle setting or retraction without joint movement. Then when joint movement is permissible the arc should be increased through active assisted, unassisted, and resisted movement until a full arc of motion is attained.

The influence of physical therapy on the end result in a fracture case is dependent primarily on how accurately the fracture has been reduced. The best physical therapy will not restore function in a part where there is bony block or malalignment from imperfect initial reduction of the broken bone. The length of time required for restoration of function, in a case where reduction has been accurate, will vary with the degree of soft tissue damage and effusion at the time of the injury. The physical therapy prescription should take into consideration reeducation in walking when the leg is ready for weight bearing. Instruction should be prescribed for restoration of normal posture, correct weight-bearing line with proper bracing of the lower back, and bal-

anced distribution of weight to the outer borders of the feet with protection of the arches and synchronous, coordinated use of both lower extremities.

Another instance of the way physical treatment is prescribed according to the pathology present is in case of a hematoma or blood tumor from a bruise or injury causing rupture of many capillaries and small vessels. Immediate cushion support with ace bandage over thick layers of cotton will tend to prevent further effusion into the tissues with attendant swelling. The greater the effusion the more material must be absorbed and the longer the convalescence. Therefore the part should be kept at rest to allow sealing of vessels. In contrast with the leg just removed from the cast, heat is contraindicated. Stroking proximal to the location of the hematoma may help to keep the lymphatic channels from accumulating absorbed products of the effusion and limit stasis. After danger of further bleeding is past, alternate hot and cold applications followed by light massage usually is beneficial. The next step is the use of heat and deeper massage with active muscle contractions to help elimination of any residual thickening and to prevent fibrosis. The acute painful stage of any injury may be prolonged by lack of rest and support or by injudicious use of heat and massage. This example should illustrate the simple and efficient way in which physical therapy can be prescribed according to the changes in pathology and physiology.

In prescribing massage we should keep in mind vasomotor response and change in distribution of blood volume. Too often physicians make the mistake of prescribing general massage without consideration of the individual's blood pressure and type of vasomotor system. Nowadays there is general agreement on the idea that each person has his own normal blood pressure and we try to avoid general statements about average pressure. The individual may be adapted to a low or high pressure within reasonable limits. Nevertheless, one cannot help but be impressed by the fact that certain individuals or families with a tendency to low blood pressure and poor vasomotor tone feel distinctly more sluggish and depressed after general massage. This seems logical if one pictures dilatation of superficial vessels over the whole body surface which would tend to cause poor filling of the heart and give lack of the physiologic heart distension which stimulates contraction. These patients do better with regional massage, covering different parts of the body at different times, or with tonic hydrotherapy. Slow rhythmic massage movements tend to give relaxation and lower blood pressure. This may be desirable in certain cases of hypertension. Brisk, vigorous massage gives primary action and secondary reflex reaction toward increasing blood pressure. If one bears these facts in mind much of the inconsistency in effects of massage in such cases may be explained and more precise prescriptions given. The movements of massage are well known and will not be reviewed.

Now we come to the question of how much detail should be given by the physician in writing a physical therapy prescription. In ordering massage, definite designation should be given as to the effect desired, exact areas to be covered, and whether superficial or deep movements are indicated. The duration of the treatment will very according to the size of the individual and the part, the specific effect desired, and speed and rhythm of movements prescribed. The physician should order transverse massage for spastic muscle groups or those in which there is a chronic fibrositis which needs to be made more pliable. In such tissues the usual nutritional massage, following the longitudinal course of a muscle, is inadequate. As long as the physical therapist understands the purpose and effect desired, the choice of maneuvers and the details of the treatment usually may be left to her judgment provided she has had approved training and experience.

In prescribing exercise, the underlying pathology should be mentioned, as well as the stage of convalescence, the effect desired, and the type of movement, such as passive, active, assisted, unassisted, or resisted. Also the frequency of performance each time and the number of exercise periods daily should be noted. In prescribing general therapeutic exercise for tonic effect, the condition of the circulatory system should be stated, any abnormality of heart or blood pressure indicated, and definite plan outlined such as whether the graduated program should be directed to exercise of effort or endurance. It is well with any program for vasomotor training, general prophylactic or corrective exercise to order the pulse taken before and at stated intervals after exertion, at least during the initial or most critical stage of treatment.

In convalescent patients who have been confined to bed for longer than one week, much discomfort in back or feet on weight-bearing will be prevented by watching posture in the reclining position and by starting exercise of key muscle groups while the patient is still in bed. Thus one retraction of the gluteals, abdominals,

and tibials may be started and repeated once every two hours, or more often if the general condition permits, and the number of active muscle movements increased according to tolerance until they may be repeated for ten efforts once an hour. Frequent muscle training in small doses is more constructive in improving strength and habit pattern than a complex exercise program carried out once or twice a day.

Manipulation to release locked joints, to free adhesions, or to reduce subluxations should be carried out by the physician who should not ask the physical therapist to assume this responsibility.

In prescribing thermotherapy a statement should be made of the effect desired and whether superficial or deep forms of heat are to be used. The prescription should include caution about any areas in which sensation is not normal. In this way, unnecessary burns are avoided. The intensity and length of time should vary with the amount of free circulation passing through the part. An extremity with impending gangrene or with arterial insufficiency so that peripheral pulses are not palpable should not have direct heat. The circulation of such a part may be helped more by reflex vasodilatation brought about by heat over the lower back to affect the legs, or over the shoulders and base of the neck to affect the arms. In an area with much induration and scar tissue superficial heat is best used at first since high frequency heating may literally cook the part, because the sluggish circulation does not permit free flowing of a safe blood volume through the issues. When a general dilatation of the capillary bed of the whole body is desired with rise in general body temperature in addition to local heat effect, short wave high frequency current or use of the hot moist air cabinet will give the response better than a heat lamp. Much of the uncertainty about choice of source of heat between lamps and high frequency currents would be dispelled if the physician bears in mind the simple principles of vasomotor control and response. If there is deep seated subacute congestion, superficial heat will dilate superficial vessels, drawing blood to the surface and relieving the overfilling of vessels in the deep congested area. If there is chronic congestion in the deep tissues with narrowed circulatory channels, high frequency current with gradual increase of dosage will be indicated for penetration with minimum surface effect. In certain states of tissue either form of heat may be satisfactory. But the length of heat application should be limited to the shortest time necessary to accomplish the desired effect. Prolonged exposure to heat leads to failure of vasomotor control and to stagnation of circulation from passive congestion. The indications and uses for hyperpyrexia are in a process of continued research and study. Its specific effect in gonorrhea in combination with chemotherapy is well recognized and its benefits, as an adjunct, in certain other affections, such as chorea, undulant fever, syphilis, and early rheumatoid arthritis, are being outlined in a rational, scientific way following careful experiments and clinical observations. The time required for body temperature to rise and white cell count to increase gives an index of the type of response of a disease to fever therapy. Response may be poor in chronic disease or after repeated series of fever treatments in any case.

Regardless of the type of heat used, the purpose is the same, namely, to give symptomatic relief, aid in the resolution of pathologic products, and facilitate healing. The forms of heat commonly included under thermotherapy are dry heat (radiant, infra-red); electrically induced heat (diathermy, short wave); and moise heat (hot packs, steam baths, saturated moist atmosphere). Elevations of body temperature occur more rapidly in saturated atmospheres. Reducing humidity tends to lower body temperature. This principle is used in air conditioning. With an air conditioning apparatus giving saturated moist atmosphere, temperature may be raised with more accurate control, greater comfort to the patient, and longer retention of deep temperature, after cessation of treatment, than the other forms of heat mentioned.

In the past few years hypothermia has been receiving due attention. Refrigeration for amputation and for depressing rate of cell growth and decreasing pain from neoplasms has led to review and advance of possible uses in physical therapy. Use of iced compresses, cold packs and cold sprays was known in early days of medical history. More accurate outlines of hypothermia or cryotherapy and sensible prescriptions may be expected.

In prescribing hydrotherapy, the form of water treatment should be indicated with the result desired and any cautions that may be necessary. Here, again, the physician should bear in mind the effects of heat and cold, of water volume or mechanical impact, of aerated or medicinal waters, steam or moist air, or moist packs. One form of treatment should not be allowed to go

on indefinitely but should progress to keep pace with clinical-pathologic change. In prescription for the therapeutic pool, care should be taken in designating whether specific individual muscle training is to be given, such as should be done in certain convalescent cases of flaccid paralysis where careful protection of recovering muscles is essential, or whether the patient is in the chronic stage and may be permitted to learn corrective swimming. While discussing this subject it seems important to mention the fact that the physical therapists who work in heated pools should not be in the pool a whole day at a time or every day for more than three weeks. Longer periods in heated water result in marked fatigue and serious consequences may follow careless supervision in this respect.

In ordering treatment of chronic infection such as hypertonic salt water pool for multiple draining sinuses from osteomyelitis (in patients who have had adequate preliminary medical and surgical care), the time of immersion, strength of the solution, and the temperature of the water should be prescribed for each case, and special precautions outlined, such as care in handling if only a shell of bone remains, thus guarding against fracture while the patient is moved into and out of the pool.

When prescribing artificial light or natural heliotherapy, eyes should be protected, gradual exposure used, and dosage increased according to reaction of the individual patient. In prescribing ultraviolet light, the physician should indicate whether an air-cooled or a water-cooled unit is desired and what degree of erythema should be planned. The physical therapist has more opportunity than the physician to test for erythema-time-dosage and should be made responsible for dosing the ultraviolet light in a way to bring about the effect requested by the physician. The physician should designate whether the effect desired is tonic, counterirritating, or desquamating. On account of different makes and construction of lamps giving different concentration of ultraviolet light, each physical therapist should make and record skin tests on herself and on each patient before beginning a series of treatments. Burners deteriorate and the same time-distance-dosage may give entirely different erythema in using two lamps of different age or make.

Electrotherapy (for other than thermal use which has been mentioned) comprises electric power transformed into force giving mechanical, physical, or chemical effects in the body. For muscular contractions, the low voltage-low frequency currents most commonly prescribed are the sinusoidal type or the interrupted pulsating galvanic. If the nerve is intact a faradic type of current may be used successfully. If the nerve shows reaction of degeneration, partial or total, the galvanic is the current of choice. In any case, instruction should be given to use the smallest dose which will accomplish the purpose, and to allow a rest period for recovery before another stimulus is applied. Electrical stimulation of muscle contraction should not take the place of voluntary active movement; but electrical stimulation of muscle contractions may be used to advantage in nerve-muscle testing; for graduated muscular contractions in certain muscles after mild sprains; in retracting muscles which have been severely stretched (such as those of the mother's abdominal wall after childbirth); in arousing response of muscle fibers in areas that have been splinted or possess scar tissue, or in parts which have lost tone from long disuse.

In prescribing galvanic current for chemical or physical effect, the physician should indicate which pole is to be active and the effect desired. If drugs are to be introduced, the strength of the solution and the appropriate pole should be made clear. In mecholyl ionization (for such diseases as thrombo-angiitis obliterans, scleroderma, or rheumatoid arthritis) the local and general reactions should be anticipated and the prescription should include subsequent attention to vasomotor effect, changes in pulse and blood pressure, and subjective symptom changes noted by the patient. A hypodermic syringe containing atropine in appropriate dosage should be prepared and kept at hand until the reaction and tolerance of each patient has been tested by the physician.

Static electricity is used for local and general effects. Its name is misleading because it is really a unidirectional flow of electrons at high voltage and low milliamperage. The potential may be 100,000 volts while the current is only a fraction of one milliampere. Local dynamic or mechanical effects are produced by static wave current, static induced current, static sparks, or static brush discharge. General tonic charge is produced by static insulation or bath, or by static head breeze. The above facts should be borne in mind in prescribing this form of electricity which is produced by friction and self-induction.

The efficiency of a physical therapy department may be seriously impaired by having the available time and space for treatment monopolized by old cases which have passed a point where specific benefit may be expected but whose

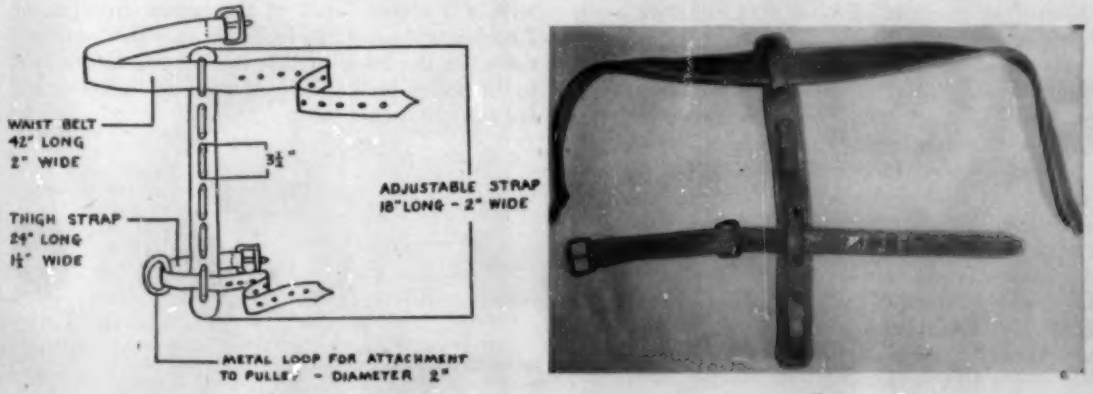
orders have not been changed by the attending physician. This state of affairs is an unnecessary expense to the institution or patient, or both, and discouraging to a physical therapist who could treat other and more critical cases more efficiently and effectively. It is as important to know just when to terminate or make a transition in physical therapy as it is to know just when to prescribe it. The cooperation between the physical therapist and the physician-director of the department should be on a basis of understanding which permits the former to call attention of the latter to cases which seem to be at a standstill or where change might be advantageous. If necessary, the physician-director should take up questions related to changes in treatment with the patient's attending physician. Everyone concerned is benefited by such teamwork.

Exercise Harness for the Use of Lower Extremity Amputees

Ann G. Stevens, 1st Lt., M.D.P.T.

To enable the amputee to manipulate his prosthesis for the optimum functional result, it is necessary that the muscles above the site of the amputation possess normal strength. This is particularly important in the treatment of amputations of the lower extremities. It has been found through experience that the most efficient way to strengthen the weakened muscles is to have the patient exercise his lower extremity against the resistance of pulley weights.

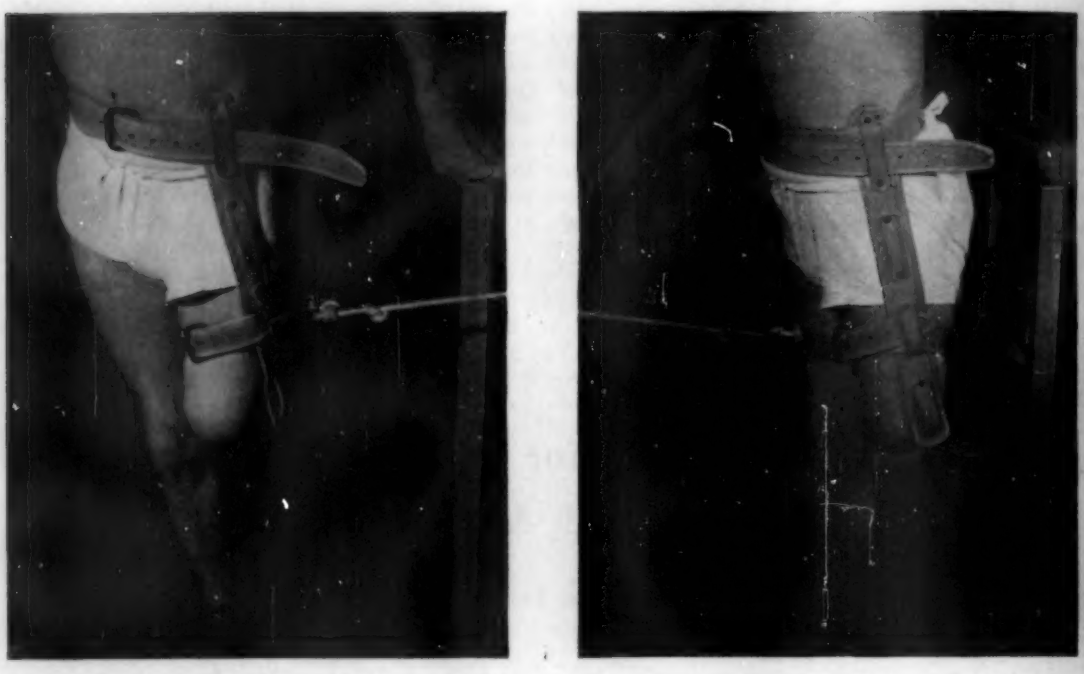
The following method of exercising amputees was used prior to World War II. A strap was applied around the arm, thigh, or leg depending upon the site of the amputation; to this was hooked the pulley rope and the patient performed



A B

Figure 1. Thigh stump harness. A. Sketch. B. Photograph.

Nichols General Hospital, Louisville, Ky.



A *B*

Figure 2. Thigh stump harness. (A) In use for resistive exercise to the adductors of the thigh. (B) In use for resistive exercise to the extensors of the thigh.

his exercise, pulling as much weight as he could tolerate. In some cases, especially with the longer stumps, this procedure proved satisfactory, but many times the strap slipped down and off the stump. The patients who had this difficulty easily became discouraged.

As most of the difficulty occurred with the thigh amputees, a harness for exercising these patients was suggested. The illustration shows the harness that was recently devised at The Army Medical Center which has proved a satisfactory solution to this problem. The harness is adjustable and therefore adaptable to any stump regardless of size or length. The straps are about 2½ inches wide, the waist belt 40 inches long, the strap extending from the waist belt to the thigh belt about 18 inches long, to which loops are attached 3 inches long and 2 inches apart. The thigh belt is about 24 inches long.

The harness for below-the-knee amputees presented a more difficult problem because of the knee joint moving from flexion into extension. A certain amount of elasticity was necessary and at the same time the harness had to offer firm support. The completed harness consists of a thigh strap about 26 inches long, a split strap attached to the thigh strap by an elastic insert about 3 inches long. The strap is about 18 inches long and is split 4 inches from its attachment to extend on either side of the knee to a stump bucket, 4 inches in depth, 4 inches in diameter, with a V-shaped split at the center front about 2 inches wide and 2½ inches deep. The loops are made on the back of this bucket for attachment to the pulley hook. The belt attached to the bucket is about 18 inches long.

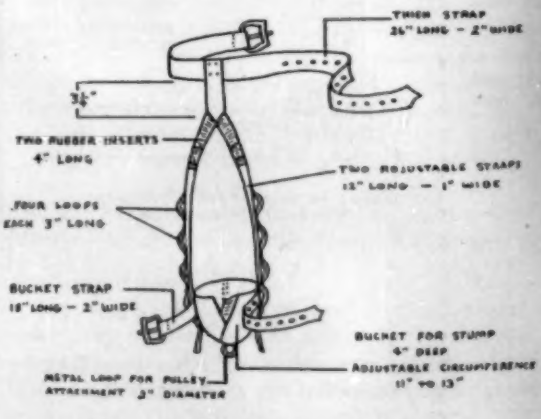


Figure 3. Sketch of leg stump harness.

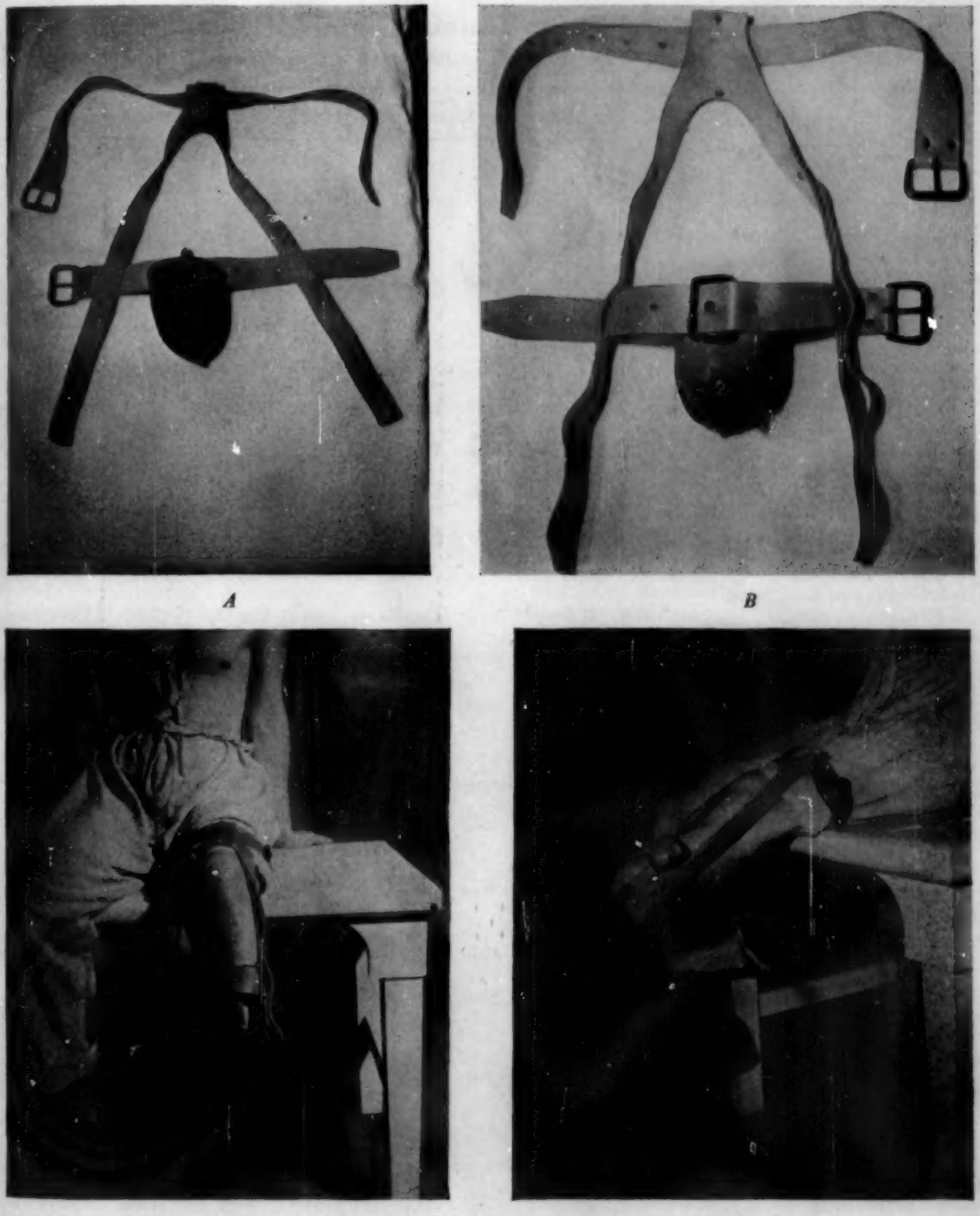


Figure 4. Leg stump harness. (A) Anterior view. (B) Posterior view. (C) In use for resistive exercise to the quadriceps—anterior view. (D) In use for resistive exercise to the quadriceps—lateral view.

As yet no harness has been developed for upper extremity amputees, but the same principle can be followed and the results should be just as gratifying.

Schools Approved for Training Physical Therapists

By Council on Medical Education and Hospitals of the American Medical Association

Name and Location of School	Entrance Requirements*	Emergency Course				Regular Course			
		Length in Months	Classes Start	Tuition	Certificate, Degree, Diploma	Length in Months	Classes Start	Tuition	Certificate, Degree, Diploma
Children's Hospital, Los Angeles	a-b-c	6	FebAug	$200	Certificate	12	FebAug	$200	Diploma
College of Medical Evangelists, Los Angeles[1]	a-b-c	..	.....	....	.....	12	JanJuly	$215	Certificate
University of California Hospital, San Francisco[1]	a-b	..	.....	....	.....	12	MarOct	$150	Certificate
Stanford University, Stanford University, Calif[1]	a-b-d[2]	7	Quart.	$286	Certificate	10	Quart.	$409	Cert. or Degree
Fitzsimons General Hospital, Denver	†	6	FebAug	None	Certificate	..	.....	.....	.....
Walter Reed General Hospital, Washington, D. C.	†	6	Quart.	None	Certificate	..	.....	.....	.....
Lawson General Hospital, Atlanta, Ga.	†	6	†	None	Certificate	..	.....	.....	.....
Northwestern University Medical School, Chicago	a-b-c	..	.....	....	.....	9	JulyOct	$200	Certificate
State University of Iowa Medical School, Iowa City	b-c[3]	6	MarSept	None	Certificate	9	MarSept	None	Certificate
Bouve-Boston School of Physical Education, Boston	a-b-c[3]	6	June	$250	Certificate	3-4 yrs.	Sept	$400 yr.	Dipl. or Degree
Harvard Medical School, Boston	a-b-c	6	Apr.&(?)	$250	Certificate	9	MarSept	$300	Certificate
Boston University, College of Physical Education for Women, Sargent College, Cambridge, Mass.	a-b-c	Given in conjunction with Harvard				19	Oct	$435 yr.	Cert. & Degree
Percy Jones General Hospital, Battle Creek, Mich.	†	6	†	None	Certificate	..	.....	.....	.....
University of Minnesota, Minneapolis[1]	a-b-c[4]	..	.....	....	.....	12	March	$168[5]	Certificate
Mayo Clinic, Rochester, Minn.[1]	a-b-c	6	JanJuly	None	Certificate	9	JanJuly	None	Certificate
Barnes Hospital, St. Louis	a-b-c	..	.....	....	.....	9	Oct	$200	Certificate
St. Louis University School of Nursing, St. Louis[1]	a-b-c[3]	8	JanSept	$250	Certificate	4 yrs.	JanSept	$250 yr.	Cert. & Degree
O'Reilly General Hospital, Springfield, Mo.	†	6	JanJuly	None	Certificate	..	.....	....	.....
Columbia University, New York City	a-b-c	..	.....	....	.....	10	FebSept	$390	Certificate
Hospital for Special Surgery, New York City[1]	a-b-c	6	Jan	$200	Diploma	9	Sept	$300	Diploma
New York University School of Education, New York City[1]	a-b-c	..	.....	....	.....	9	FebSept	$432	Cert. or Degree
Duke University School of Medicine, Durham, N. C[1]	a-b-c	..	.....	....	.....	12	AprOct	$200	Certificate
Cleveland Clinic Foundation Hospital, Cleveland	a-b-c	..	.....	....	.....	9	Sept	None	Certificate
D. T. Watson School of Physical Therapy, Leetsdale, Pa.[1]	a-b-c	6	AprOct	$200	Diploma	12	Oct	$200	Diploma
Graduate Hospital of the University of Pennsylvania, Philadelphia, Pa.[1]	a-b-c	..	.....	....	.....	12	JanSept	$200	Certificate

Name and Location of School	Entrance Requirements*	Emergency Course: Length in Months	Emergency Course: Classes Start	Emergency Course: Tuition	Emergency Course: Certificate, Degree Diploma	Regular Course: Length in Months	Regular Course: Classes Start	Regular Course: Tuition	Regular Course: Certificate, Degree, Diploma
Brooke General Hospital, San Antonio, Tex.	†	6	JanJuly Oct	None	Certificate	..	.....	.....	.....
University of Texas School of Medicine, Galveston	a-b[6]	..	.....	....	.....	9	JanMar July	$130[5]	Certificate
Richmond Professional Institute, Richmond, Va.	a-d[6]	6	Sept	$200[5]	Certificate	9-12	Sept	$200[5]	Cert. & Degree
Ashford General Hospital, White Sulphur Springs, W. Va.	†	6	†	None	Certificate	..	.....	.....	.....
University of Wisconsin Medical School, Madison[1]	a-b-c	..	.....	....	.....	9	Sept	$96[5]	Certificate

*Courses are so arranged that any of the entrance requirements will qualify students for training. a = Graduation from accredited school of nursing; b = Graduation from accredited school of physical education; c = Two years of college with science courses; d = Three years of college with science courses.

†For complete information regarding entrance to Army training schools write to Major Emma E. Vogel, Director of Physical Therapy Aides, Office of the Surgeon General, War Department, Washington, D. C.

1. Male students are admitted.
2. High school graduates accepted for a four-year course leading to A.B. degree; students admitted quarterly and tuition is $143 per quarter.
3. High school graduates admitted to regular course.
4. Medical technology graduates with B.S. degree also admitted.
5. Nonresidents charged additional fee.
6. Those with degree from any accredited college also accepted.
7. Students with two years of college admitted to emergency course only.

CHANGE OF ADDRESS

All changes of address must be sent directly to the office of THE PHYSIOTHERAPY REVIEW, 720 North Michigan Avenue, Chicago 11, Illinois, by the 20th of the month prior to the publication date, if the next issue is to be received. Both the old and new address must be given.

The Physiotherapy Review

Editor-in-Chief: MILDRED ELSON

Associate Editors
GERTRUDE BEARD
LOUISE REINECKE
BESS SEARLS

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Physical therapists everywhere can well be proud of their record of service to their country. In the army and navy they are on duty throughout the world. Theirs is not an easy life—as we know from the letters we receive—but as always when there is a job to do they do it well—and cheerfully. A physical therapist's day is never done until the last patient is treated. This is true also of those employed in a civilian capacity. The response of our members to the emergency created by the anterior poliomyelitis epidemic, as we expected, was excellent. Hospitals and other institutions which released their personnel to meet the need are commended. This meant curtailment of service as well as increased load on those remaining in the institutions.

We as an association are still small numerically. Postwar needs are estimated at fifty per cent above our present membership. Some of our approved schools can expand their courses in order that more can be trained. Due to lack of available teachers in physical therapy it seems unwise to establish more schools. It is hoped, however, that additional courses for the graduate physical therapist may be organized to enable her to enter the teaching field. Much of this is part of the postwar plan, since many of our members overseas will return to us to take an important role in the development of our profession. In the meantime additional personnel must be trained. Information concerning schools and scholarships may be obtained from your National Office. As an individual, or as a chapter, keep this is mind and help us to get more qualified students into the field of physical therapy.

Army News

In accordance with Circular 358 published by the Army Service Forces on 30 October 1944 the grade of student physical therapy aide in the Medical Department of the Army was reallocated from an ungraded position (salary $420 per annum) to SP-3 (salary $1440 per annum) and that of apprentice physical therapy aide from SP-3 (salary $1440 per annum) to that of SP-4 (salary $1620 per annum).

Appointment to these positions is made in the Office of The Surgeon General from registers submitted by the U. S. Civil Service Commission. An applicant must not have passed her 38th birthday, must meet citizenship and physical requirements in accordance with army regulations, have no dependent children under 14 years of age and must agree to apply for a commission as physical therapist upon the satisfactory completion of subsequent apprenticeship training.

Assignment to the position of student physical therapy aide is available only to women who are college graduates who have majored in the field of physical education or the biological sciences. These courses are conducted by the Medical Department in army general hospitals.

Upon the satisfactory completion of the six-months' training, these students are reallocated to the position of apprentice physical therapy aide and assigned to selected general hospitals for six months of apprenticeship training, special attention being given to instruction in the treatment of war injuries. Appointments to this position are also available to students who have completed an approved six-months' course in physical therapy conducted in civilian institutions.

Upon the satisfactory completion of the period of apprenticeship, if otherwise qualified, these trainees will be commissioned as physical therapists in the Medical Department of the Army as second lieutenants. The salary for this position is $1800 per annum in addition to $21 per month for subsistence, plus an initial clothing allowance. If government quarters are not available, these officers receive additional allowances. This commission will be for the duration of the war and six months thereafter for service wherever needed, in this country or overseas.

Application blanks may be obtained from local post offices or by writing to either the U. S. Civil Service Commission or to The Surgeon General, U. S. Army, Washington, D. C.

WAVES Need Physical Therapists

Each day the war in the Pacific becomes more intense and each day the casualties are mounting. It is imperative that these wounded men be given the finest medical attention possible. Physical therapists now serving in the WAVES are doing a splendid job in caring for our wounded Navy men, but since the demand for their services is far greater than their number, the Navy urgently needs more physical therapists.

Women who are graduates of a physical therapy school which is approved by the American Medical Association are qualified to apply for a commission in this capacity directly from civilian life. No practical experience is necessary. However, therapists who have had no practical experience will work under the direct supervision of an experienced physical therapist for a minimum of one year. Because of the urgency of the program, applications may be accepted from women who are in their final semester of training in order that the commission may be delivered immediately upon graduation.

Women married to Naval officers or mothers of children under 18 years of age are not qualified applicants.

The age of a candidate at the time she is commissioned will determine the rank and the amount of income she will receive:

Age	*Rank*	*Approximate Pay Scale*
20-33	Ensign	$2,600
34-41	Lieutenant (j. g.)	3,000
42-49	Lieutenant (s.g.)	3,600

In addition, she will receive an allowance of $250 for uniforms.

The accepted officers will be sent to the U. S. Naval Hospital, Bethesda, Md., or to the U. S. Naval Hospital, San Diego, Calif., for approximately ten days indoctrination before reporting to a Naval activity for duty.

Additional information and applications for the WAVES physical therapy program may be obtained by writing to your nearest Office of Naval Officer Procurement.

National Public Health Nursing Day

Hundreds of communities throughout the country are planning to celebrate the first National Public Health Nursing Day, January 26, 1945. The theme will be "Know Your Public Health Nurse—Who She Is, What She Does."

The purpose of the "Day" will be to focus attention upon public health nursing as a service for *everyone*, and increase public understanding of the part played by the public health nurse in helping build better health for family, community and nation.

Cancellation of 1945 Conference

In response to a request from the Office of Defense Transportation that all conventions be cancelled, the Executive Committee voted at its semi-annual meeting to cancel the 1945 conference. Details will be sent out in a membership letter.

Infantile Paralysis Pamphlet

The proceedings of the Round Table Discussion on Infantile Paralysis held at the 1944 annual conference are now available in printed form—cost 25c. This booklet may be obtained from the American Physiotherapy Association, 1790 Broadway, New York 19, N. Y.

"Mademoiselle"

In the December 1944 issue of "Mademoiselle" there is a full page picture of a physical therapy student at Hospital for Special Surgery, New York City, treating a patient with anterior poliomyelitis. A short caption appears with it stating that information on courses of physical therapy may be obtained from the American Physiotherapy Association, 1790 Broadway, New York 19, N. Y. This has brought many requests for information concerning physical therapy.

Informational Material

A booklet of informational material on physical therapy will be ready about the middle of January and will be available to chapters, members and others for distribution to high school vocational guidance directors, clubs and any individuals interested in physical therapy. It may be obtained from the American Physiotherapy Association, 1790 Broadway, New York 19, N. Y.

1945 Directory of Members

Due to difficulties in printing we were unable to publish the directory of members during 1944. The 1945 directory will appear early in the year. All address changes will be made as of November 15, 1944.

Your attention is called to the excellent article entitled "Physical Therapy in a Plastic Surgery Unit" by Captain Honor C. Wilson, A.I.F., Australia. We feel that this paper is so important that we have devoted a major portion of this issue of the REVIEW to it.

Baruch Committee

Fellowships

The Baruch Committee on Physical Medicine is offering two or three fellowships in physical therapy. Excerpts from a letter from Dr. Ernest J. Jaqua, Education Director of the Committee, will give you the conditions under which these fellowships are to be granted.

"In recommending that a few fellowships for physical and occupational therapy technicians be provided, the Scientific Advisory Committee suggests that these be granted under the following general conditions:

"(a) To technicians who had successful experience both as teachers and clinicians but whose place of leadership—especially as teachers—would be enhanced by further study.

"(b) The fellowships should be for one year, but with the possibility of continuance in cases of exceptional merit. The annual stipend should be $1500 for maintenance and tuition.

"(c) That the candidate should be working for an advanced degree (M. or B.D.), and that her previous academic record should give evidence of genuine intellectual ability.

"(d) It would be understood that following the period of graduate study the student would return to teaching, or a combination of teaching and clinical work.

"In general, the purpose of the Baruch Committee in offering a limited number of fellowships for physical and occupational therapy technicians (perhaps two or three a year) was to increase the number of exceptionally well qualified teachers or technicians. Such a plan would supplement the effort of the Committee to establish stronger centers of teaching and research for physical medicine physicians. By granting these fellowships, it was hoped a few exceptionally promising young people of limited resources might continue study on an advanced level who otherwise might not be able to do so."

The candidate should write a letter of application to the American Physiotherapy Association, 1790 Broadway, New York 19, N. Y., stating age, educational background, chronological experience in physical therapy, and give at least three references who can vouch for professional ability, personality and character. A paragraph should also be included stating why further study is desired and the use the candidate plans to make of this advanced study. Transcripts of credits should be sent to this office in duplicate.

Final awards are to be made by the Baruch Committee on Physical Medicine.

Grants

The Administrative Board of the Baruch Committee on Physical Medicine has announced the granting of an additional total sum of $185,000, which is being given by Mr. Bernard M. Baruch for the further advancement of the program in physical medicine and the physical rehabilitation of those disabled in the war. This sum has been divided into seven grants as follows: $50,000 to the Massachusetts Institute of Technology, Cambridge, Massachusetts; $40,000 to the Medical School of the University of Minnesota, Minneapolis, Minnesota; $30,000 to the Medical School of Harvard University, Boston, Massachusetts; $30,000 to the Medical School of the University of Southern California, Los Angeles, California; $15,000 to the Medical School of the University of Iowa, Iowa City, Iowa; $15,000 to the Medical School of the University of Illinois, Chicago, Illinois; $5,000 to Marquette University Medical School, Milwaukee, Wisconsin.

The grants to Massachusetts Institute of Technology and the University of Minnesota are in addition to the gift of $1,100,000 made by Mr. Baruch in April of 1944, at which time grants were made to Columbia University College of Physicians and Surgeons, New York University College of Medicine, the Medical College of Virginia and for minor research and fellowship programs for the advancement of physical medicine.

The present gift to Massachusetts Institute of Technology is in support of a five-year program of training and research in electronics, instrumentation and physics in relation to medicine, to be carried on under the auspices of the Department of Biology and Biological Engineering. It was the conviction of the Scientific Advisory Committee of the Baruch Committee on Physical Medicine that Baruch Fellows and other physicians should have more than a superficial knowledge of the physics and technology underlying the physical methods and instrumentation used in this field and it was suggested that training in this aspect might effectively be centered at the Massachusetts Institute of Technology. The program will be under the general supervision of Doctor Francis O. Schmitt, head of the department of biology and biological engineering and under immediate supervision of Doctor K. S. Lion, assistant professor of applied biophysics, who is an expert in physical instrumentation.

The grant of $40,000 to the University of Minnesota is to support the development of a three-year teaching and fellowship program in physical medicine. The primary objective of the

program is to be the furtherance of fundamental training of research workers and teachers. The program has as its basis the development of scientists in the field of physical medicine. As an auxiliary to this basic training will be developed facilities for the training of clinicians and technicians.

The other grants have been allocated from the fund of $200,000 given by Mr. Baruch in April. The sum of $30,000 was granted to Harvard University Medical School for establishment of a three-year program to provide fellowship or residencies to be used for the benefit of qualified physicians who are selected to be trained in this field. This sum will be administered by a strong standing committee of physical medicine recently appointed by Dean C. Sidney Burwell of the Harvard Medical School, composed of Doctors J. A. Ayer, D. Denny-Brown, W. T. Green, J. H. Means, A. L. Watkins and E. M. Landis (Chairman). Appointments to the fellowships, which generally carry stipends of $2500, will be made annually but may be renewed to provide up to three years of specialized study and research. Emphasis will be placed upon training a few men in basic research and clinical investigation.

Unusual opportunities for clinical experience and research in the psychologic and psychiatric aspects of physical medicine will be available at Harvard. The first year will be wholly or in part devoted to basic research related to physical medicine in one of the preclinical sciences such as physiology, anatomy or biophysics. The second year will be spent in clinical training in physical medicine at the Massachusetts General Hospital and other hospitals affiliated with the Harvard Medical School. In the third year, fellows will be assistants in physical medicine with clinical responsibilities. For candidates with extensive previous training, one-year clinical fellowships will also be granted. Applicants must have an M.D. degree from an approved medical school and a minimum of one year of internship in an approved hospital. Applications may be obtained from the Dean, Harvard Medical School, 25 Shattuck Street, Boston 15, Massachusetts.

The sum of $30,000 is granted to the University of Southern California to inaugurate a program of teaching and research in physical medicine in its medical school. The sum of $15,000 is granted to the University of Illinois to inaugurate a teaching program in physical medicine at its medical school. The sum of $15,000 is granted to the Medical School of the University of Iowa to assist in a joint research and teaching program concerning the effectiveness of different methods of applying heat to the deep tissues of the human body. Finally, the sum of $5,000 is granted to the Medical School of Marquette University, Milwaukee, Wisconsin, for continuance of research in the physiology and pathology of nerves and muscles as related to physical medicine.

Georgia Chapter

The Georgia Chapter of the American Physiotherapy Association held a meeting at Georgia Warm Springs Foundation, Warm Springs, Ga., on Saturday, November 4, 1944. During the business session in the afternoon, Miss Alice Lou Plastridge and Miss Lamoille Langworthy, our delegates to the 23rd Annual Conference, presented reports. In the evening Dr. Harold N. Johnson, staff member of the International Health Division of the Rockefeller Foundation, spoke on "The Laboratory Diagnosis of Neurotropic Virus Infections." Dr. Robert L. Bennett, Director of Physical Therapy at the Foundation, spoke on "The Early Care of Anterior Poliomyelitis." Fifteen members and one guest were present.

New Members

The following are new members of the American Physiotherapy Association:

Adams, Meryl Gillian, 1732 Grand Ave., Santa Barbara, Calif.
Akers, Anne, Overseas.
Amonette, Grace E., U. S. Marine Hospital, San Francisco, Calif.
Andrews, Clara M., Overseas.
Andrews, Hazel V., Halloran Gen. Hosp., Staten Island, N. Y.
Chedel, Marjorie E., 148 Broad St., Middletown, Conn.
Conant, Corrine, Valley Forge Gen. Hosp., Valley Forge, Pa.
DePouw, Lorretta, 233rd Gen. Hospital, % Harmon Gen. Hosp., Longview, Tex.
DeValle, Clifton, Overseas.
Dumond, Edith L., Baxter Gen. Hosp., Spokane, Wash.
Erickson, Hazelle M., Tilton Gen. Hospital, Fort Dix, N. J.
Fountain, Freeman, U. S. Naval Hospital, Portsmouth, N. H.
Goldman, Elayne Ruth, 171 Linwood Ave., Buffalo, N. Y.
Hoard, Donna Rae, 233 S. Johnson St., Iowa City, Iowa.
Hoel, Jeanne Patricia, 1045 Morgan Ave., Drexel Hill, Pa.
Howe, Mary, 1113 University Ave., Columbia, Mo.
Iben, Alberta L., Fitzsimons Gen. Hosp., Denver, Colo.
Kopolsky, Shirley, 440 Linwood Ave., Buffalo, N. Y.
Lewis, Adeline, Overseas.
Ludwig, Mary Jane, Canoe Hill, New Canaan, Conn.
Marks, Mrs. Blanche A., 4312 Walnut St., Philadelphia, Pa.
Montague, Marjorie, Section 5, Fort Lewis, Wash.
Osborne, Shirley J., McCloskey Gen. Hosp., Temple, Tex.

Saxton, Jane Allen, LaGarde Gen. Hospital, New Orleans, La.
Seggel, Janet R., DeWitt Gen. Hosp., Auburn, Calif.
Speddy, Mrs. Florence M., 14 Arnold Park, Rochester, N. Y.
Sumner, Mary F., 2 North 11th Ave., Yakima, Wash.
Tipton, Dorothy G., ASF Regional Hospital, Fort Benning, Ga.
Verona, Vita, 1466 Commonwealth Ave., Brighton, Mass.
Walker, Gladys E., Garfield Park Comm. Hosp., Chicago, Ill.
Werner, Ruth E., Lawson Gen. Hosp., Atlanta, Ga.
Wroe, Martha C., Vaughan Gen. Hosp., Hines, Ill.
Wyatt, Virginia, 533 McKinley Ave., Pomona, Calif.
Ybarra, Dorrys B., Regional Hosp., Camp Robinson, Ark.

Recent graduates of Stanford University, Calif.:

Dennis, Marjorie	Ingels, Helen
Gillette, Mary A.	Leary, Margaret M.
Hegstrom, Hildur M.	Llorente, William
Huttula, Elma M.	Prinzing, Dorothy Margaret

Recent graduates of Walter Reed General Hospital, Washington, D. C.:

Allmon, Minnie Lee	La Rue, Jack
Ashbury, Gladys I.	Latta, Harriet G.
Dingus, Blanche E.	Newett, Marian A.
Dishon, Lois I.	Renfrow, Imogene
Duncan, Sue M.	Robertson, Edith I.
Finke, Elizabeth M.	Rustad, Lorraine
Gordon, Shirley Marie	Strawbridge, June M.

Recent graduates of Bouve-Boston School, Boston, Mass.:

Boericke, Beatrice A.	O'Brien, Phyllis
Fleming, Josephine I.	Ricker, Joyce
Harrington, Mary Pat	Tillinghast, Lois
Morse, Nancy Jensen	Tracy, Ethel V.

Army Promotions

The Surgeon General of the Army announces the following promotions of Medical Department Physical Therapists to the grade of First Lieutenant:

Name	*Present Station*
Anderson, Charlotte	Camp Blanding, Fla.
Binning, Marcel	Welsh Convalescent Hospital, Daytona Beach, Fla.
Brooks, Elizabeth M.	Camp Joseph T. Robinson, Ark.
Brown, Norma	Randolph Field, Tex.
Call, Marion L.	Overseas
Campbell, Nell K.	Overseas
Collins, Martha D.	Army Air Field, St. Petersburg, Fla.
Cooper, Ruth P.	Schick General Hospital, Clinton, Iowa
Dean, Noelle	Overseas
Denney, Ruth R.	Overseas
Dougan, Mary L.	Barnes General Hospital, Vancouver, Wash.
Gruenwald, Emma	Overseas
Hagan, Constance	Lawson General Hospital, Atlanta, Ga.
Long, Dorothy K.	Camp Van Dorn, Miss.
Luther, Helen G.	Fort Riley, Kans.
Mailhoit, Viola R.	Overseas
Moore, Margaret L.	O'Reilly General Hospital, Springfield, Mo.
Mosiman, Ella B.	Army Air Base, Hunter Field, Ga.
Osborne, Shirley J.	McCloskey General Hospital, Temple, Tex.
Platt, Jean	English Field, Amarillo, Tex.
Provost, Clara	West Point, N. Y.
Rice, Emma H.	Fort Belvoir, Va.
Roberts, Florence S.	Overseas
Rodenberger, Miriam L.	Overseas
Swanson, Ingrid E.	Overseas
Talbot, Charlotte	Overseas
Timm, Shirley E.	Overseas
Tschierschke, Anna	Davis Monthan Field, Ariz.
Utecht, Frances A.	Kennedy General Hospital, Memphis, Tenn.
Uvick, Agnes	San Antonio Aviation Cadet Center, Tex.
Welch, Esther J.	Overseas
Wilson, Elizabeth	Overseas

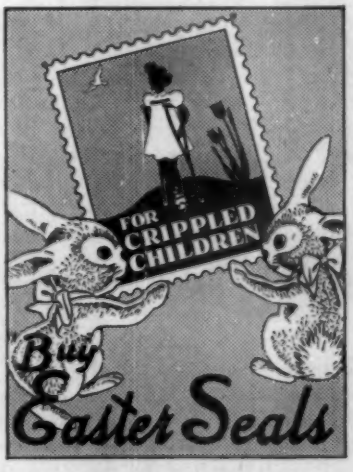
The Surgeon General of the Army announces the following promotions of Medical Department Physical Therapists from the grade of First Lieutenant to the grade of Captain:

Christman, Louise	Hoff General Hospital, Santa Barbara, Calif.
Whitehurst, Margaret	Fort Bragg, N. C.

Easter Seals

The twelfth annual sale of Easter seals for crippled children, sponsored by the National Society for Crippled Children and its affiliated organizations, will be conducted this year from March 1 to April 1.

One of the important activities being financed by the sale of Easter seals this year is a study which was initiated by the National Society for Crippled Children to gather data regarding the problem of convalescent care. The study is being carried out on a nationwide basis under the



direction of a committee of professional persons headed by Dr. A. L. Van Horn, of the United States Children's Bureau.

The committee has retained Miss Kathleen Allen, Washington, D. C., to direct the study on a full-time basis. The committee will examine the needs in convalescent care for the crippled in this country; the coordination of hospital treatment and hospital care; the physical effect of long bed rest; the use of activity and recreation during convalescence, and the social effect of institutional residence. It will attempt to define convalescence for (a) ordinary medical and surgical cases, (b) chronic patients and (c) those needing vocational therapy. The study will encompass the convalescent needs of children suffering from a variety of handicaps, not those alone who are suffering from orthopedic deviations. Special attention will be given to patients suffering from rheumatic fever. By means of this study, it is proposed to bring new information to those who manage convalescent facilities and those who train personnel for the administration of special institutions and homes. The study will penetrate a variety of the special fields involved in convalescent services.

Index to Current Literature

Amputations

Amputations. R. I. HARRIS. J. Bone and J. Surg., Oct. 1944.

The Army Amputation Program. LEONARD T. PETERSON. J. Bone and J. Surg., Oct. 1944.

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Refrigeration Amputation. JAMES LOCKE NELLER and ERWIN R. SCHMIDT. Wisconsin Med. J., Sept. 1944.

Refrigeration Anesthesia for Amputations. SERGEI S. YUDIN. Amer. Rev. Soviet Med., Oct. 1944.

Anterior Poliomyelitis

The Epidemiology of Poliomyelitis. ROBERT WARD. J. Bone and J. Surg., Oct. 1944.

The Work of the National Foundation for Infantile Paralysis. BASIL O'CONNOR. Arch. P. T., October 1944.

The Kenny Treatment Assessed. J. Chart. Soc. Physio., Oct. 1944.

Kenny Treatment Combined with Neurotripsy in Care of Poliomyelitis. J. WAYNE MCFARLAND, HARVEY E. BILLIG, JR., G. MOSSER TAYLOR and CLARENCE W. DAIL. Arch. P. T., Nov. 1944.

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Pneumococcic Arthritis. W. P. BOGER. J.A.M.A., Dec. 23, 1944.

The Effect of Penicillin on Rheumatoid Arthritis. EDWARD W. BOLAND, NATHAN E. HEADLEY and PHILIP S. HENCH. J.A.M.A., Nov. 25, 1944.

Bone and Joint Injuries and Diseases

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Bursitis in the Region of the Tibial Collateral Ligament. ALLEN F. VOSHELL and OTTO C. BRANTIGAN. J. Bone and J. Surg., Oct. 1944.

Fractures

Fractures of the Ankle. ERNEST BURGESS. J. Bone and J. Surg., Oct. 1944.

March Fracture; A Statistical Study of Forty-Seven Patients. DARRELL G. LEAVITT and HARRY W. WOODWARD. J. Bone and J. Surg., Oct. 1944.

March Fracture; A Report of Three Hundred and Seven Cases and a New Method of Treatment. ABRAHAM BERNSTEIN and JOSEPH R. STONE. J. Bone and J. Surg., Oct. 1944.

Heat and Cold

The Reactions of the Nasopharynx to Heat, Cold and Disease with Some Therapeutic Considerations. PHILIP S. MOUNTJOY. J. Ind. State Med. Assoc., Sept. 1944.

Refrigeration Amputation. JAMES LOCKE NELLER and ERWIN R. SCHMIDT. Wisconsin Med. J., Sept. 1944.

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Refrigeration Anesthesia for Amputations. SERGI S. YUDIN. Amer. Rev. Soviet Med., Oct. 1944.

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ABSTRACTS

John S. Coulter, M.D.

A Comprehensive Rehabilitation Center

Walter J. Zeiter, M.D., Shelby Gamble, M.D., and Bell Greve, Cleveland, Ohio. In ARCH. P. T., 25:11:657, November 1944.

In order to extend these services to all persons, a rehabilitation center may be needed to supplement services existing in the community, particularly hospitals. The first step in organization is the appointment of a board of directors of persons interested in a rehabilitation program, such as industrialists, physicians and representatives from service clubs.

A medical advisory board is equally important to assume responsibility for medical policies and procedures of treatment. This should include specialists in the disabilities, such as an orthopedist, an industrial surgeon, a cardiologist, a phthisiologist, a psychiatrist, a physical therapy physician and an internist. To coordinate the function of a medical advisory board it is well for the chairman to serve as a member of the board of directors.

Summary

This article presents the services necessary in a rehabilitation center. The object of such a center is to provide services which are not readily available in the community hospitals and institutions. In order that a rehabilitation center may function efficiently, it is necessary to have a medical social service department, a department of physical medicine and a department of vocational guidance and training, as shown in the plan of a comprehensive rehabilitation center.

Heat and Cold in Therapy of the Eyes

F. H. Rodin, M.D., San Francisco. In ARCHIVES OF OPHTHALMOLOGY, 32:4:300, October 1944.

Summary

Heat and cold have been used in the treatment of ocular disorders from time immemorial.

Heat is a vasodilator, produces increased hyperemia and accelerates metabolism and leukocytosis. It is beneficial in the treatment of most inflammatory conditions, particularly of the anterior segment of the eyeball.

Cold is a vasoconstrictor, allaying pain and promoting healing by the production of anemia in the presence of chemosis and congestion.

My method of applying hot and cold compresses to the eye by means of moist cotton tied in the bowl of a wooden spoon with gauze has given gratifying results. The equipment is simple, safe and easily procurable.

Nerve Degeneration Following Prolonged Cooling of an Extremity

Alfred Large, M.D., and Peter Heinbecker, M.D., St. Louis, Mo. In ANNALS OF SURGERY, 120:5:749, November 1944.

Summary

Immersion of a dog's limb in water at 6 C. for 96 hours results in edema and in temporary depression of sensory and motor function of the exposed extremity. It is followed by varying degrees of degeneration of the nerves in the cooled area, without demonstrable histologic changes occurring in other tissues. Although direct injury from the cold may play a minor role, the degenerative changes are regarded as being due essentially to ischemia of the part during and following the cooling period.

Treatment of Poliomyelitis

Irving J. Sands, M.D., Brooklyn. In NEW YORK JOURNAL OF MEDICINE, 44:90:2247, October 15, 1944.

In order to discuss the treatment of poliomyelitis intelligently, it is opportune to review certain fundamental etiologic and pathologic facts regarding this disease. Poliomyelitis is an acute infectious disease that is caused by the invasion of the nervous system by a filtrable virus. This virus is one of the smallest of the filtrable viruses that can be passed through the finest filters and membranes, that is resistant to phenol and ether, and that is most readily dissolved by oxidizing agents such as hydrogen peroxide and potassium permanganate and by ultraviolet rays, and by heating to a temperature of 55 C. for as short a time as five minutes. The virus has been found in human stools and in sewage. This virus is highly neuronotropic in its tissue affinity. Furthermore, it has been shown that there are apparently several types of poliomyelitis viruses, so that the serum of a monkey convalescent from one type will not protect the monkey against a different strain. This may account for second attacks of poliomyelitis. Experiments have indicated that the most likely portal of entry in the human is the tonsillarpharyngeal region, and also the gastro-intestinal tract, most probably by way of the mouth. The virus reaches the nervous system by the regional cranial or peripheral nerves. It travels along the axones, reaching the nerve cell proper. It is striking that as soon as it reaches the central nervous system it is localized in the motor cortex of the brain, the diencephalon, the mesencephalon, the medulla, the pons, and the spinal cord, the motor cells being the ones invariably involved.

Summary

1. Poliomyelitis is a disease caused by a specific virus which enters the human being through the mouth and the alimentary canal. The virus is found in the central nervous system, in the walls of the alimentary canal, in stools, and in sewage.

2. The virus travels along the axones and lodges in the motor cortex of the brain, the diencephalon, the mesencephalon, the medulla, and the anterior horn cells of the spinal cord. The cells of the motor apparatus are the ones that are involved in the pathologic process. Poliomyelitis, therefore, is a neurologic disease.

3. Clinical poliomyelitis may be classified according to the predominant signs into (1) abortive type, (2) meningeal type, (3) myelitic type, (4) bulbar type, (5) bulbomyelitic type, and (6) encephalitic type.

4. The treatment of poliomyelitis is symptomatic and palliative; heat, gentle massage, and early passive manipulation should be employed even in the acute phase of the illness. Convalescent serum still is useful.

5. Persistent physical therapy for months and years must be employed to overcome paralyses that may follow.

6. Possible effective prophylactic measures are discussed.

Physiopathology, Treatment and Prevention of Frost Injuries, with Special Reference to Frost Injuries in Warfare

P. Liebesny. In NEW YORK STATE J. MED., Oct. 1, 1944.

Liebesny differentiates seven types of frost injuries: (1) erythema and edema, (2) blisters and bullae, (3) superficial gangrene, (4) gangrene of skin and subcutaneous tissue, (5) gangrene of a whole part of an extremity or other parts of the body, especially the ears, (6) injury to muscles, tendons, periost, bone and nerves without or with accompanying lesions of the skin, (7) chronic relapsing lesions of the skin; e. g., chilblains and other forms of erythrocyanosis. Application of heat in frostbite is inadvisable. This is true in first aid as well as in treatment. The defrosting of frozen parts must be done by means of wet dressings with water of 41 to 58 F. Rubbing or massaging of the frozen parts should be avoided. The therapeutic effect of refrigeration in frostbite may be explained partly by its antiphlogistic effect and partly by the fact that it permits only a gradual increase in the temperature of the frozen parts up to normal body temperature, so that there is sufficient time for the improvement of circulation. To achieve improvement in the circulation, short wave therapy of low intensity has been found effective by the author and by Italian clinicians. The short wave current is applied with air spaced electrodes. The treatments are given daily for ten minutes. The current is applied in such a manner that the increase of the temperature of the skin in the treated area does not exceed 0.5 degree C. after ten minutes of application. Recovery is usually accomplished with few treatments. Leriche and Knulin recommend anesthetic infiltration of the lumbar and stellate sympathetic in patients suffering from frostbite with edema and pain. Nearly all patients were immediately relieved. The infiltrations were repeated on the following two days. If there was no necrosis or infarction, patients were well in a few days. Transfusions of plasma in patients suffering from frostbite of large areas and of high degree are advisable. These transfusions should be given during the first twenty-four hours.

The Treatment of Chronic Arthritis

J. Albert Key, M.D., St. Louis, Missouri. In WESTERN J. SURGERY, OBSTETRICS AND GYNECOLOGY, 52:9:396, September 1944.

Patients with chronic arthritis can be divided into two great groups—atrophic and hypertrophic. These appear to be two different diseases, and measures which are of value in the treatment of one type may or may not be of value in the treatment of the other.

Atrophic arthritis is also called rheumatoid, proliferative or infectious arthritis. It is a chronic progressive crippling disease which may begin at any age and tends to progress by remissions and eventually to involve most of the joints of the victim. It is primarily a disease of the synovial tissues and the joints may become deformed and ankylosed. The disease may subside spontaneously at any time or it may pursue a relentless course until the patient is a hopeless cripple.

Physical Measures—Rest: Rest is regarded by many as the corner stone of the treatment of atrophic arthritis. In certain instances where the joints are very acute and painful, it may be advisable for the patient to remain in bed for a week or ten days, but certainly not for a longer period of time. Every effort should be made to keep these patients out of bed and, in my opinion, on their feet.

They should go to bed early and should have ample rest in bed at night and the bed, in so far as possible, should be made comfortable. They should lie down and rest in the middle of the day and, if necessary, in the middle of the afternoon, but they should get up every day and should bear weight on their extremities. This is to prevent, or at least to slow, the progress of the atrophy of bone in the extremities and should be done even when the joints are acute and when walking is painful. Likewise, they should, if possible, carry on their normal occupation in order to avoid as much as possible sitting and thinking of their illness and the hardness of their fate. If they cannot do this or if they have no occupation they should be given some sort of work to do.

In hypertrophic arthritis the changes in the joints are partly caused by use, and these joints are in need of protection and rest. Patients should be especially warned that they should not attempt to work out the rheumatism in their joints by exercise. Their activities should be restricted and, if necessary, their occupation should be changed. It is to be remembered that reduction in weight is a very effective means of resting joints which bear weight.

Strain on knees can sometimes be lessened by altering the shoes. Likewise, elastic bandages or knee caps are useful, but tend to cause muscle atrophy and their use is not to be overdone. Braces are rarely necessary. The temporary use of a crutch or a cane may be very beneficial, but it is difficult to persuade these patients to use artificial support when they can get along without it. They should be advised that it is important to give the worn-out joint some respite.

Exercises. These should be prescribed by the physician and carried out by the patient according to definite regulations. In certain instances it is necessary that the exercises be carried out under supervision. The exercises are directed both to the muscles of the extremities and to those of the trunk, it being impressed particularly on the patient that breathing and abdominal exercises are important. Most of the exercises can and should be carried out in bed. They not only tend to delay the atrophy of muscles and bone, which is characteristic of the disease, but they also tend to keep the joints moving and improve the patient's posture. Every joint should be put through its normal range of motion if possible at least twice every day and the patient should be given a definite set of postural and other exercises to follow and these should be increased as the patient's ability to carry them out increases, and this ability will increase, even though the disease may be progressing. The patient should become posture conscious, not because correction of posture will cure the disease, but it is one step in his battle back to health.

Fever Therapy. It is now generally conceded that fever therapy has little or no influence on the course of atrophic or hypertrophic arthritis and that there is no justification for using it in the treatment of these conditions.

Diathermy. There is some discussion as to whether short wave or long wave diathermy is more useful. As far as I have been able to determine, the effect obtained by diathermy is only that of an analgesic and has no beneficial effects on the course of the disease. Likewise, it does not have any local curative effects. As a matter of fact, I do not know of any good effect that diathermy has on the joint which cannot be obtained by less elaborate means. If carried out to excess it may cause atrophy of the bone and this is harmful.

Heat and Massage. Heat and massage may be given by skilled physical therapiststs or by the patient's family or attendant at home.

Hydrotherapy. Hydrotherapy, such as whirlpool baths, contrast baths and swimming pools are useful for their stimulating effect.

Finally, while physical therapy of various types is important, it should be stated that it does not cure arthritis, but is only a means of building up the patient's general muscle power, relieving pain and helping to maintain mobility in the joint which is treated. It is also useful for its psychological effect, as most arthritics love attention.

Occupational Therapy. Occupational therapy is useful as a form of exercise for the muscles and joints and also for its psychological effects.

Physical Therapy in Aftercare of Amputations of Lower Extremity

Signe Brunnstrom, Lieutenant, (j.g.) W-V (S) (H) U.S.N.R. In NAVAL MEDICAL BULLETIN, 43:4:644, October 1944.

Summary

1. Importance of correct bed posture immediately following amputation is stressed.

2. Knee flexion, hip flexion and hip abduction contractures must be guarded against.

3. Straight alinement of pelvis and thighs is obtained by "squaring" the pelvis, by avoiding the use of a pillow under the stump, and by encouraging the prone position.

4. Active nonweight-bearing exercises are begun at an early stage. All parts of the body are exercised. The motions of knee extension, hip adduction and hip extension are particularly emphasized.

5. When attempting to overcome contractures, manual stretching of tight muscles is avoided. Instead the pattern of "reciprocal innervation" is made use of to secure relaxation.

6. True contractures, involving capsule and ligaments, are overcome by the application of plaster or by continuous traction.

7. The early use of a pylon is recommended.

Effect of a New Type of Gyrating Mattress on the Cutaneous Temperatures of the Extremities of Human Beings

Grace M. Roth, Ph.D., Gordon M. Martin, M.D., Charles Sheard, Ph.D., Mayo Foundation, Rochester, Minnesota. In ARCHIVES OF PHYSICAL THERAPY, 25:10:609, October 1944.

From time to time various mechanical devices have been introduced to increase the blood flow of the extremities of patients suffering from peripheral vascular disease. Since some of the earlier mechanical devices have not proved to be as effective as was originally anticipated, any new type of apparatus, particularly if reports of its successful use are given, is received enthusiastically even before adequate tests have been made to determine its physiologic effects. The present study was undertaken to determine whether a newly introduced gyrating mattress would cause an increase in the peripheral blood flow.

Summary and Conclusions

This is a preliminary report of the observations made on forty persons. Our study did not reveal any significant change in the blood pressure or pulse rate during the gyrating action of the mattress and no particular sedative action was apparent while the motor of the gyrating mattress was running.

When observations were made on the cutaneous temperatures of the fingers and the toes of the 10 normal persons under basal conditions and under a constant environmental temperature of 25.5 C. (78 F.) with the subject lying quietly on the bed without gyrating of the mattress for a period of an hour, no increase of the cutaneous temperatures of the fingers and toes took place. During the next hour when the gyrating of the mattress was continuous, there was likewise no increase, but in general a slight decrease. These observations indicate that the peripheral blood flow does not increase on use of the gyrating action of the mattress. When similar determinations were made on 15 patients suffering from chronic rheumatoid arthritis and on 15 who had peripheral vascular disease, again a slight decrease in the cutaneous temperatures of the fingers and toes took place. This mild vasoconstriction of the peripheral blood vessels might be explained in part by the slight feeling of annoyance which exists while the mattress is gyrating. When the results obtained with the gyrating mattress were compared with those obtained by the ingestion of a meal, the oral administration of 95 per cent ethyl alcohol and the immersion of one hand in water at 45 C. for one hour, it was found that the increase in the cutaneous temperature of the fingers and toes which followed all these measures did not take place from the gyrating of the mattress. Thus it seems, under the conditions of these investigations, that no increase in the peripheral circulation occurred when this mechanical device was used.

The Effect of Exercise on the Electrocardiogram in Adolescent Boys

Dan L. Urschel, M.D., Mentone. In JOURNAL OF THE INDIANA STATE MEDICAL ASSOCIATION, 37:10:563, October 1944.

The effect of exercise on the electrocardiogram has been frequently studied, both in normal and in pathologic subjects. There exists a general agreement on the significance of certain major changes in the curve following exercise, but various opinions remain regarding the less prominent changes. There are also differences of opinion regarding the amount of exercise which should be used to induce these changes. Master has done extensive work on a "two-step test" of exercise tolerance, which he feels can be used to provide a standard amount of exercise, depending on sex, weight, and age of the patient, without danger to the patient's cardiac condition. He has published several articles on the electrocardiographic changes occurring in normal individuals and in patients with various types of cardiac pathology. His method seems much safer than that of Twiss and Sokolow, who exercised their patients on stairs until pain appeared or dyspnea developed.

Conclusions

Electrocardiograms were taken before and after vigorous exercise in a group of five high school freshmen, ranging in age from thirteen to fifteen years. These electrocardiograms were made at the beginning of an athletic season while the boys were in relatively poor condition.

There were no notable electrocardiographic changes from exercise in this group. The QRS complexes, in particular, remained almost unchanged. The P waves became somewhat sharper, and in one patient became sharply upright after having been diphastic or inverted. ST segment changes were almost entirely absent. Respiratory sinus rhythm became much less marked after exercise. The height of T4 was increased by exercise in all cases. The height of T2 was increased in four. T3 showed no constant change. T1 showed little change.

From this series it would seem that vigorous exercise does not produce any characteristic changes in the electrocardiograms of normal adolescent boys.

Eye Exercises for Defective Vision

In JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:12:772, November 18, 1944.

Revival of interest in the unorthodox methods of treating visual defects, the result of Mr. Aldous Huxley's "The Art of Seeing," was discussed in THE JOURNAL June 31, 1943.

Bates hypothesis that visual derangements and refractive errors due to a deformation of the eyeball, resulting from nervous and muscular strain of the superior and inferior oblique muscles, and that the ciliary muscle has nothing to do with the focusing of the eye, is contrary to well established scientific and clinical observations. Huxley himself admits that his visual acuity has not improved. His point is that he has learned how to use what he has to better advantage. Lancaster in a recent contribution advances the thought that "buried in a mass of what to ophthalmologists seem foolish gestures and performances, best defined as hocus pocus, there are sound and fruitful ideas." He would remind the ophthalmologists that seeing is only half ocular; the other half is cerebral. Since seeing is only partly a matter of the image on the retina and the sensation it reproduces and is in still larger part a matter of the cerebral process of synthesis, in which memories play a principal role, it follows that by repetition, practice and exercise one builds up a substratum of memories useful for the interpretation of sensations and facilitates syntheses which are the larger part of seeing.

This physiologic concept of the function of vision is not new. As Duke-Elder points out in his review of Huxley's book, visual defects are sometimes muscular in origin, sometimes psychologic.

The Significance of Muscle Spasm—In the Acute Stage of Infantile Paralysis Based on Action Current Records

R. Plato Schwartz, M.D., Harry D. Bouman, M.D., and Wilbur K. Smith, M.D., Rochester, N. Y. In THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:11:695, November 11, 1944.

From the available conclusive data the authors establish the following points:

1. In some patients spasticity has been recorded in all muscles which we have investigated.

2. Evidence of spasticity has been recorded from (a) weakened muscles, (b) the antagonists of weakened muscles and (c) muscles which exhibit no clinical or other evidence of weakness.

3. The evidence does not support the view that fibrillation or inflammation of the muscle is responsible for the spasticity.

4. On stretching the antagonist of a weakened muscle, the evidence of spasticity in the weakened muscle is frequently greater than the recorded reaction of the muscle in response to voluntary contraction.

5. On stretch reflex of a weakened muscle, spasticity not only is recorded from its antagonist but also is significantly present in records of the corresponding muscles of the opposite extremity.

6. In association with voluntary contraction efforts this spasticity spread was recorded from the same group of muscles as resulted from stimulation by stretch reflex noted in 5.

7. But a muscle which shows no clinical evidence of weakness always produces a stronger voluntary contraction record than the recorded evidence of muscle spasm.

8. There has never been recorded evidence of spasm when a muscle failed to produce a record of reaction to the voluntary movement.

9. Spasticity is a generalized phenomenon in the early stages of infantile paralysis.

10. As prevailing spasm diminished in a weakened muscle, there was recorded evidence of increased strength in the voluntary contraction.

11. The gross initial spasm of neck and back muscles, so characteristic with onset of the acute stage, invariably disappears without evidence of muscle weakness or paralysis.

12. There was no correlation between the degree of spasm and the incidence of muscle weakness or paralysis.

Summary

From action current records made in relation to the study of the neuromuscular reactions of patients in the acute stage of infantile paralysis we conclude that the spine sign is a gross manifestation of the lesser degree of spasm recorded in muscles of normal and subnormal strength.

In association with the latter, certain functional abnormalities other than muscle weakness were observed in the lower reflex arc. They could be most readily explained in terms of a dysfunction at/or proximal to the dendrites or cell body of the lower motor neuron. This dysfunction resulted in a partial isolation of the lower motor neuron from the inhibition normally induced by other levels through long and short neural pathways. The degree of lower reflex arc isolation thus established and the degree of viability remaining in the lower motor neurons therefore determined the amount of muscle spasm in each instance.

Without the involvement of levels proximal to the lower motor neuron there would be no spasm, but the muscle could be either weak or normal, dependent on the number of normal motor neurons innervating the muscle.

If all motor neurons failed to be stimulated by the stretch reflex there would be no reaction to the stretch reflex even though relationships proximal to the dendrites were normal.

Occupational Therapy in a Private General Hospital

John S. Coulter, M.D., Chicago. In J.A.M.A., 126:6:360, Oct. 7, 1944.

Occupational therapy is divided roughly into the following groups:

1. *Preventive or Diversional Therapy.*—This type of occupational therapy comprises simple prescribed activities, including recreation, which serves to induce rest, to control general exercise, to prevent neuroses and to sustain morale.

2. *Functional Therapy.*—This type comprises prescribed activities planned to assist in the restoration of articular and muscular function, to improve the general condition, to build physical endurance and to aid in mental rehabilitation and in the treatment of mental disorders. Aitken has shown the value of functional occupational and physical therapy in the rehabilitation of the industrial casualty.

3. *Prevocational Therapy.*—This type comprises work processes planned and prescribed to prepare a patient for his return to his former employment or for vocational education.

Most large general hospitals maintained by county, state or federal funds have an occupational therapy department. A statement concerning the coordination of the physical and occupational therapy departments by Watkins emphasizes that the combined departments should be directed by a physician specializing in physical medicine.

It is believed that every general hospital regardless of size should have an occupational therapy department, because it is as necessary as a physical therapy department and any other therapy. The occupational therapy department should be in the department of physical medicine and under the supervision of a physician specializing in physical medicine.

When occupational therapy is being carried out the posture assumed by the patient is most important, whether the patient is in bed or sitting in a chair.

In the curative workshop power reduction factors, such as psychologic inhibitions, pain, fear, and fatigue, are eliminated as much as possible.

It is believed that the psychologic inhibitions of the workshop require that the environmental conditions there be superior to those of the man's normal environment.

Recreational therapy, through competitive games, can often supply the desired exercises that the patient requires. The devices used may be a checkerboard on the floor or wall, darts, pingpong, horseshoes and pool tables.

Recreation gives mental relaxation after the workshop. Games are played with the technician and are manipulated in such a way that the patient is encouraged to strive against and to excel the technician. During rehabilitation of an injured man, one may spend a long period of time training him vocationally, but if he is unable to achieve his proper position under social conditions he will never become really rehabilitated. A man must be helped to adjust himself to a group and to

be at ease in conversation with his companions so that he can join in the games of the group and become a part of it.

In the treatment of the injured workman, Griffiths' observations on the conditioned reflex of industry should always be observed. He says in part:

"The conditioned reflex of industry is a very complex affair. Take, for example, the skilled carpenter using a saw. The action is one of pushing and pulling the saw, but long practice has produced a conditioned reflex in which each stroke of the saw corresponds almost exactly with the previous or succeeding strokes. The reflex developed is a nice example of negative successive induction, but it is not the simple affair of alternate contraction and relaxation of the biceps and triceps or of the serratus magnus and latissimus dorsi muscles. The beautifully balanced muscle action involved depends on many different conditioned stimuli.

"To mention only a few of these: There are the touch stimuli from both hands. In the saw hand a definite tactile discrimination is associated with the man's own saw (as every tradesman uses his own tools). Thus the same part of the skin of his hand is stimulated every time he grips this particular saw. There is the stimulus of bone vibration set up by the wave-length of the saw being used, so that the farther the saw is thrust the shorter the vibration wave, ultimately suggesting the point at which the reflex action of the thrust shall be reversed. There is in addition the sound reflex, the rasp of the saw, and here again the note alters with the progress of the saw through the wood. When the conditioned reflex is first established a knot in the wood will cause a temporary interruption in the reflex path and tend to throw the muscles out of proper coordination so that there must be a period of conscious action before reflex action is reestablished. But as time goes on the extra resistance of a knot in the wood itself produces a superimposed conditioning stimulus and sets forth a bigger muscular effort without interfering with coordination."

Dr. Storms in the Workmen's Compensation Clinic at Toronto, Canada, gives his patients occupational therapy that eventually works into industrial conditioned reflexes. A gravel box is provided with a fence that can be varied in height. Laborers who use shovels at their work can shovel gravel over this fence. Dr. Storms has rigged hand and foot levers which are weight regulated by cans or bags of sand attached to the beams for steam shovel operators.

Early Ambulation Following Abdominal Section

In JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:9:594, October 28, 1944.

Nelson reports observations on 426 personally conducted cases. As soon as the patient has fully recovered from the effects of anesthesia, the bed is sharply tilted, so that the head is elevated. After this position has been maintained for a time the bed is leveled and the patient assumes a sitting position on the side of the bed, with the feet resting on a chair. In this position he breathes deeply and coughs frequently. He then lies down, and the head of the bed is again sharply elevated. After a second period of rest he is assisted to stand and is conducted to the bathroom, where the bladder is practically always emptied without difficulty. If his condition is good he sits up in a chair for a time before returning to bed. Those who are oversensitive to the pain of the first rising or who are unduly apprehensive are made to practice sitting at the edge of the bed, with intervals of rest after each attempt, until they are strong enough and willing to walk to the bathroom. The majority of patients walked on the day of operation or within the first twenty-four hours. The incidence of immediate and delayed complications in this series was minimal. Of the three partial disruptions of a wound two occurred in patients whose wounds had been closed with catgut and for whom early ambulation had not been authorized. Only two incisional hernias were observed. The single fatality in the series was due to cerebral thrombosis. Good results depend on the strict observance of contraindications as well as of indications. Contraindications to early ambulation are: (1) Failure to observe the prerequisites of optimum healing of wound, including failure to carry out the tenets of Halsted as to the closure of a wound, the use of suture materials other than wire or cotton and the existence of deficiencies of vitamins and hypoproteinemia. (2) Conditions such as shock, peritonitis, active hemorrhage, cardiac failure, pneumonitis and impending or actual thyroid crisis. (3) Potential or actual complications including gross contamination, infection, hemorrhage and dehiscence. (4) Pregnancy in which abortion is feared. (5) Extreme debility, for which ambulation is deferred until there is some restoration of strength and muscle tone, as a result of sitting up. (6) Second stage of a thoracolumbar sympathectomy, after which the patient, because of sudden alterations in the vascular system, cannot immediately tolerate the upright position. (7) Lack of adequate and intelligent nursing supervision. The advantages of early ambulation include the lowered incidence of postoperative complications, particularly pulmonary and vascular complications; the lower incidence of nausea, vomiting and abdominal distention; the earlier return of normal function of the bladder and the bowel; the maintenance of normal muscle tone; the psychologic effect on the patient's morale and mental status; the acceleration of convalescence and the earlier return of working ability, and the economic savings to the patient and the hospital.

The Fallacy of Massage in the Treatment of Obesity

S. William Kalb, M.D., Newark, N. J. In J. MED. SOC. OF NEW JERSEY, 41:11:407, November 1944.

Since the dawn of civilization, massage, rubbing, or pounding has been used as a means for reducing the overweight individual. In recent years massage has become a common practice. Millions of people have accepted it in the hope of finding an easy way to lose weight.

Summary

In forty patients with obesity on low caloric diets, there was a loss in total body weight and a decrease in the circumference of the limb which was massaged. There was a similar decrease in the measurements of the opposite limb which was not massaged.

In twenty patients with obesity—with no dietary restrictions but who received body massage, there was no loss in total body weight and no decrease in the circumference of the limb which was also massaged with a vibrating machine.

Conclusion

General body massage or local massage by means of a vibrating machine, alone, is ineffective in decreasing total body weight or the circumference of a limb in patients with obesity.

Periarthritis of the Shoulder Joint: Classification, Pathology, and Treatment

James M. Tarsy, M.D., Brooklyn, New York. In NEW YORK STATE J. MED., 44:19:2116, October 1, 1944.

Periarthritis of the shoulder, or its more descriptive synonym, "frozen shoulder," may be induced by a wide variety of surgical and medical conditions. Our interest in this paper, however, lies mainly in the medical phases of periarthritis as well as in those surgical entities which enter into the picture and which are ultimately capable of leading to this disability.

Since the causative factors in one group (Group I) are still in doubt, a more concise terminology is suggested: primary periarthritis (periarthritis of uncertain origin). Conversely, since cases falling in the second group (Group II) follow a more or less definite causative sequence, the term "secondary periarthritis" (periarthritis of known origin) is proposed.

Treatment of Periarthritis

Choice of therapy and subsequent response in primary and secondary periarthritis once more point to an essential causative difference between these two forms in question.

In primary periarthritis recovery is best obtained by a combination of local and systemic measures. In the secondary form ruptured tendon fibers must first be allowed to repair by rest, and mobility must be reestablished by subsequent manipulation, heat, massage and other measures.

Treatment of the primary form encompasses a wide variety of therapeutic measures, including, for the debilitated patient, bed rest for a period of weeks. Treatment of hormonal inbalance is effected with estrogens or thyroid extract. Manipulation of the affected extremity, ranging from cautious stretching to full maneuverability under anesthesia, also is advised. Continuous stretching with traction apparatus appears to be the method of choice with many. Ultraviolet light, removal of focal infection, and other systemic measures also are advocated.

Aside from the above systemic measures, based on pathology, a novel form of therapy is here proposed. This includes (1) injection of the specific structures involved followed by manipulation; (2) relief of pain and spasm by block anesthesia and subsequent stretching of the affected extremity.

Block anesthesia and manipulation may be followed by a series of excellent measures advocated by Kendrick. These measures, herein outlined, however, were not employed by me in this series. Following manipulation:

Light traction should be applied to the arm, which is maintained in a position of 90 degrees abduction and 90 degrees external rotation.

During the first twenty-four to forty-eight hours ice caps are applied to the shoulder.

During the first two days following manipulation a complete range of motion is executed passively.

On the third day diathermy of low intensity is employed, followed by active movements of the arm.

On the fourth day active exercise of the arm by means of an "exerciser" attached to the head of the bed is instituted. This is followed by the reapplication of traction after each treatment. This traction should be used constantly during the first week.

At the end of one week the patient may be allowed out of bed for short periods.

During the final few days of treatment more active exercises are added, such as "wall-climbing" and placing the arm behind the head and back.

After ten days to two weeks the full range of motion is persistently maintained. Finally, the patient should be kept under close observation and physical therapy and exercises should be continued until mobility and normal muscle tone are completely established.

Two forms of therapy have been employed for the treatment of this disability: (1) injection of the specific muscular and tendonous structures involved; (2) block anesthesia and manipulation.

Getting Patients Out of Bed Early in the Puerperium

In JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:9:589, October 28, 1944.

To the Editor: On page 839 of THE JOURNAL of July 22 Dr. Morris L. Rotstein of Baltimore makes the statement that during the blitz of 1940-1941 London maternity patients delivered in hospitals were allowed up a day after labor and sent home on the second or third day postpartum. He adds that "no ill effects resulted from this mode of treatment."

It would seem that Dr. Rotstein is under some misunderstanding, for although one-half of the institutional confinements in London take place in hospitals directly under my control and I am in close touch with the voluntary hospitals responsible for the remaining institutional births in London, I have never heard of such a routine. The true facts may interest your readers. During the whole war period, all expectant mothers who could be persuaded to leave London were evacuated at the eighth month to country maternity homes organized by the Ministry of Health and there they were retained until the usual fourteen days after confinement. At the end of this period they were discharged to country billets with their infants, but many returned soon after to their homes in London, especially if the blitz was not active.

Of the mothers who could not be persuaded to leave London, those who were normal medically and whose homes were suited for confinements were expected to have their babies at home. This is the usual prewar custom in England, and we did not depart from it during the blitz, but of course enemy action rendered many houses unsuitable and added to the pressure on our beds. Further, all hospitals retained the fourteen day period during the early part of the war, but many (including the London County Council's hospitals) were obliged to reduce the mothers' stay to ten or twelve days as accommodation was reduced by bombing or by necessary air raid precautions. Any woman who had to be sent home earlier (which very rarely happened and never before the seventh day) was conveyed by ambulance and a visiting nurse was sent to care for her. It is also true that in two areas of London where hospital accommodation became very short the women were (and are still) transferred by ambulance to a suburban hospital with excellent accommodation on the fourth day, but they are not expected to go home till the twelfth day. No bad effects have been reported, but the arrangement is much disliked by the women and will be abandoned directly events permit. It is probably a garbled version of this plan which has reached Dr. Rotstein.

May I add that we have had many attempts in the last forty years to introduce a shortened puerperium into English midwifery practice but they have never taken hold. The present tendency is to insist more firmly than ever on six to seven days in bed and a

total fourteen days of rest and exemption from household duties, with a longer convalescence still after complicated confinements. The value of graduated physical exercises during the antepartum period and from the third or fourth day of the puerperium is of course widely appreciated.

ALLEN DALEY, M.D., Medical Officer of Health, London County Council.

Unusual Reactions to Electroshock

Carroll W. Osgood, M. D., Wauwatosa, Wisconsin. In J. NERVOUS AND MENTAL DISEASE, 100:4:350, October 1944.

Ordinarily the giving of the electroshock is a very simple procedure. The operator pushes a button; the patient immediately loses consciousness, has a tonic convulsion lasting about 10 seconds, then a clonic convulsion lasting about 30 seconds; he remains unconscious five to ten minutes, then opens his eyes, stirs a little, answers when spoken to and gradually, over a period of half an hour or more, regains his orientation. The later course, of a depressed patient, is characterized by an increase in energy and initiative, increased cheerfulness and at the same time some impairment of memory. Usually the improvement in energy and mood persists while the memory difficulty quickly clears.

Unfortunately the course is not always so smooth. Not infrequently, for instance, when the memory clears the depressed mood tends to return, particularly where there are unpleasant situations to be faced; or sometimes the pendulum swings too far and the depressed patient becomes hypomanic, or perhaps the memory does not clear up quickly and the patient fears that the treatment has done him permanent harm. What we speak of as "memory" is a complex function difficult of measurement, and I will content myself for the present to agree with the observations of most writers who casually refer to the problem that permanent memory impairment has not been seen.

The second late reaction to be described is characterized by dazed retardation. After several treatments there seems always to be a certain degree of what is loosely referred to as "confusion," a term including memory difficulty, disorientation, impaired comprehension, and lack of judgment, but my colleagues and I have been able to recall 16 patients who were outstandingly dazed and retarded.

Anyone giving electroshock has doubtless observed with some anxiety many of the reactions here described. Our observations would seem to lend support to the general feeling that it is preferable where possible to treat patients within institutions rather than as outpatients. I believe, however, we are justified in telling relatives that while patients may be made temporarily worse, mentally, as well as subjected to certain physical hazards, and while their psychoses may be activated or may progress in spite of treatment, the patients are seldom if ever made permanently worse.

Motor Nerve Function with Lesions of the Peripheral Nerves: A Quantitative Study

Major Abner M. Harvey, Medical Corps, Army of the United States and S. W. Kuffler, Sydney, Australia. In ARCHIVES OF NEUROLOGY AND PSYCHIATRY, 52:4: 322, October 1944.

Summary

The method described here allows an accurate and objective evaluation of muscle function in cases of lesions of the peripheral neuromuscular system. Records can be made from most of the muscles of the extremities.

The motor nerve is stimulated by an induction shock, and by records of the muscle action potential the localization and extent of partial lesions of the nerve can be established. An ordinary induction coil is sufficient for stimulation, and the muscle action potential can be recorded by means of an electrocardiograph or any standard amplifying system.

The extent of nerve injuries and the course of various types of lower motor neuron involvement can be determined. The method also is useful in the diagnosis of hysterical muscular dysfunction.

Spasticity and weakening are two separate phenomena, each dependent on specific disturbances of functions of the anterior horn calls.

There was every indication that spasm ran its course like other clinical manifestations of the disease.

The relationship between muscle tenderness and muscle spasm has not been clarified by the work thus far done. As in the past, we should continue to differentiate between pain and hyperesthesia from discomfort due to muscle soreness.

The authors emphasized the clinical phenomena and the electromyographic evidence which indicates that muscle spasm does not initiate the development of muscle weakness.

Convulsive Shock Therapy in Involutional States After Complete Failure with Previous Estrogenic Treatment

A. E. Bennett, M.D., and C. B. Wilbur, M.D., Omaha, Nebraska. In AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 208:2:176, August 1944.

Conclusions. Seventy-five consecutive cases of midlife and involutional mental disorders were obtained from the study of about 500 case records. All of these had received varying amounts of estrogenic hormones without benefit.

This series was treated with convulsive shock therapy and psychotherapy or with psychotherapy alone, combined with thorough psychiatric supervision. Under this treatment, 90 per cent showed social or full recovery in 4 to 6 weeks.

Estrogenic hormones have no place in the treatment of psychiatric disorders except for symptomatic relief of vasomotor symptoms. Convulsive shock therapy is a near specific for the relief of all types of affective disorders, especially involutional melancholia.

These facts need wider dissemination before the general and psychiatric professions to save time and expense of needless nonscientific treatment in this misunderstood group of patients. Estrogens should further be condemned because they may be harmful and often make the psychiatric disorder more severe.

The Role of Hydrotherapy in Rehabilitation

H. J. Behrend, M.D., New York City. In NEW YORK STATE JOURNAL OF MEDICINE, 44:90:2255, October 15, 1944.

Physical therapy is only one—however, an important one—of these therapeutic procedures. Its importance must be emphasized because it can be usefully applied in all steps of the rehabilitation program even when the phase of physical restoration seems to have been completed. The object of this presentation is to draw attention to this fact and to show the usefulness of one of the branches of physical medicine in every rehabilitation program—namely, hydrotherapy.

Anatomical and Physiological Considerations in the Alignment and Fitting of Amputation Prostheses for the Lower Extremity

Atha Thomas, M.D., F.A.C.S., Denver, Colorado. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:4:659, October 1944.

In the proper fitting and alignment of the amputation prosthesis, knowledge of the structure and function of the normal joints of the lower extremity, as well as of the relation of the joint axes to each other, is essential. Also of value is an understanding of the mechanics of normal locomotion and its relation to the pathomechanics of the gait with a prosthesis.

Conclusions

It should be emphasized that, in the successful use of the amputation prosthesis, alignment and fitting are of first importance. Materials and complex joint mechanisms are entirely secondary. Fitting of the prosthesis should be individual and should be carried out at the place of manufacture under the supervision of the attending surgeon, working in complete cooperation with the limb maker. Both surgeon and limb maker should possess a thorough understanding of the anatomical and physiological principles of limb-fitting as described here. Only by the practical application of such principles can the normal physiological gait be approached, and the amputee be enabled to use his prosthesis with the greatest efficiency and comfort, and without undue awkwardness or fatigue.

Studies on Fracture Convalescence—I. Nitrogen Metabolism After Fracture and Skeletal Operations in Healthy Males

John Eager Howard, M.D.; William Parson, M.D.; Kay Eisenberg Stein, Harry Eisenberg and Virginia Reidt. In BULLETIN OF THE JOHNS HOPKINS HOSPITAL, 75:3:165, September 1944.

Discussion

Nitrogen losses of a magnitude sustained by our fracture patients are probably of considerable importance to the body economy and must not be overlooked in designing therapeutic measures. Other types of trauma also are associated with losses of body nitrogen. Factors which might conceivably play a role in these nitrogen losses are: disuse, anesthesia, sulfonamide compounds, fever and infection. These will be briefly discussed. A more detailed discussion of the part played by diet will appear in a subsequent paper.

Disuse atrophy. It is common knowledge that exercise of a part results in muscle hypertrophy and, conversely, disuse results in tissue atrophy. When a limb is removed from a cast after a long period of immobilization, the wasted tissues appear in sharp contrast to the good limb. It is obvious, therefore, that nitrogen is lost from the immobilized limb, be it to the exterior or to some other part of the organism. It is believed, however, that the protein losses herein discussed are, in but small part, accounted for by disuse. For the factor of disuse was equally present in the osteotomy cases, with similar areas immobilized under identical environmental conditions; yet the total nitrogen losses exhibited by the fracture patients greatly exceeded those in the operative cases. There may have been more atrophy in the fractured limbs than in the operative cases after cast removal (although this was not discernible) but, if so, other factors than disuse must be called on to account for it.

Planned Convalescence

Edward W. Lowman, Lt. Comdr. (MC) U.S.N. In U. S. NAVAL MEDICAL BULLETIN, 43:4:619, October 1944.

Planned convalescence is the full utilization of a patient's idle time in physical and mental pursuits with the threefold purpose of (1) returning him more speedily to duty, (2) furthering his military technical training, and (3) stimulating vocational and avocational interests which may later be of value in civilian or military life.

Conclusions

1. The value of planned convalescence has been adequately demonstrated by the British and by the U.S. Army Air Forces. Over twenty-five million man-hours alone have been conserved in 15 months by the Army Air Force program.
2. The primary objective attainable in an adequate convalescent program is the prevention of hospital fatigue and the consequent earlier return of men to duty status.
3. The second objective is that, through judicious use of classroom and workshop therapy, men may be trained in technical Navy rates during their idle convalescent time so that when returned to duty they may be better qualified to carry on their duties.
4. By inclusion of academic and workshop therapy of practical value in civilian life, a degree of vocational orientation and stimulation can be effected which may prove extremely valuable to ultimate civilian rehabilitation.
5. In a convalescent program there can be no timidity or inertia. At this advanced date, initiation of the program must be definitive and expeditious if the Services' part in rehabilitation is to surpass their ineffectual part in the first world war. The challenge is here to be met.

The Relation of Physiotherapy to Plastic Surgery

J. P. Reidy, F.R.C.S. In PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE, 35:12:705, October 1944.

(1) Preoperative application.—General: Breathing exercises to reduce anesthetic problems, e.g., in old people. Local: (a) Heat and massage to improve movements and circulation—in limbs about to be immobilized; in areas about to be excised, or grafted; and to soften and loosen scars prior to excision.

(2) Intermediate application.—(a) Improving circulation of, say, an abdominal tubed pedicle, before transference. (b) Heat and massage to cramped upper and lower limbs during intermediate stages of operations, chiefly concerned during the transference of a tubed pedicle to distant areas.

(3) Postoperative application.—Indirect: Restoration of movements and circulation in cramped shoulders, forearms, etc., when fixation is removed. Treatment in nerve and muscle lesions. Direct: Treatment to all types of grafts, free and pedicled, to reduce the degree of contracture in free grafts, and to improve circulation and appearance suture lines in all types. For the free grafts, light rotatory grease massage usually is employed. This is easily taught to the patient who can continue it out of hospital.

(4) Remedial application.—(a) Purposive splinting with exercises against elastic resistance to increase range and power of movement, e.g., in burned hands. (b) Active exercises designed to restore movement, e.g., jaw exercises after bilateral condylectomy; restoration of function in stiff limbs following fixation in hand joints after burns and/or skin grafting. These exercises are accompanied by massage, heat, saline soaks, and wax baths; galvanism when required.

Acute Brachial Radiculitis

J. W. Aldren Turner, D.M., M.R.C.P., T/Major, R.A.M.C. Command Neurologist. In BRITISH MEDICAL JOURNAL, No. 4374:594, November 4, 1944.

The duration of the severe pain before muscle weakness first appeared has varied from a few hours to two weeks or possibly slightly longer, the usual length of time being three to four days. The severe pain tends to pass off as the weakness develops, and may be replaced by a dull ache; but in some cases severe pain has lasted for two to three weeks, although the paralysis has occurred within a few days of the onset of the pain. The onset of weakness in the majority of cases is sudden, with a maximum at the onset, but four patients said that the weakness had progressed over the course of two to three days.

With the lack of knowledge of the etiology, treatment can be only palliative—analgesics for the pain in the actue stage, support for paralyzed muscles to prevent stretching, and active and passive exercises and electrical stimulation of the affected muscles when the painful stage has passed.

Summary

The syndrome of pain around the shoulder, followed in the course of a few days by muscular weakness and wasting and at times sensory changes, is described.

The anatomical distribution of the weakness can be a single peripheral nerve, two or more spinal roots, or combinations of these.

A number of apparent precipitating factors are mentioned, the most outstanding being operation for hernia in 8 of the 36 cases.

The possible etiology is discussed and an analogy drawn between this condition of acute brachial radiculitis and serum neuritis.

Reconditioning in Chest Surgery

Colonel John B. Grow, Major Omer M. Raines and Major Ora L. Huddleston, Medical Corps, Army of the United States. In THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:17:1060, December 23, 1944.

The problems to be overcome in the physical reconditioning of the patient convalescing from a surgical disease of the chest are (1) a lowered vital capacity, (2) a decrease in stamina and strength incident to a protracted debilitating illness, (3) postural defects and (4) the loss of power of large muscle groups incident to extensive muscle cutting incisions. The other phases of reconditioning, educational reconditioning, occupational therapy and recreational and diversional activities are fully as important in this type of patient as in other groups, owing to the usual history of long standing disease with its attendant depression of morale.

Tuberculosis

The rehabilitation of the tuberculous patient is a long term program, which, owing to the nature of the disease, must be carried out under the supervision of a phthisiotherapist.

From the standpoint of reconditioning, we have found it convenient to group the cases of empyema and lung abscess not associated with bronchietasis together.

As the patient's condition permits, breathing exercises, calisthenics and outdoor drills and marches are engaged in. Vigorous physical activity has been found to be of definite benefit in hastening the obliteration of empyema and lung abscess cavities. The usual experience is that by the time the empyema or lung abscess cavity has disappeared the patient has been restored to his normal weight, stamina and strength.

The reconditioning of patients following pulmonary resection may be divided roughly into three stages: (1) the immediate convalescent care, (2) the physical therapy period, comprising the period from the seventh postoperative day to the twenty-first postoperative day, and (3) the period from the twenty-first postoperative day to the time of his discharge from the hospital, when he is a patient in the reconditioning service.

The seventh to the twenty-first postoperative days fall into the physical therapy period. During this time breathing exercises and shoulder exercises are started while the patient is still confined to the ward. The shoulder exercises consist of moving the arm through a complete range of motion supplemented by repeated passive exercises. Later these are changed to active assistive exercises and active exercises of the shoulder girdle. The shoulder exercises are unilateral and confined to the operative side. Breathing exercises are bilateral and symmetrical and involve the contractions of the accessory respiratory muscles as well as the regular inspiratory and expiratory muscles during strong, forced breathing.

After the third postoperative week the patient's convalescence is sufficiently advanced that he may be transferred to the Reconditioning Service. The exercises concentrate in increasing the vital capacity and restoring the strength of the shoulder girdle. The men are trained in the use of and encouraged to engage in activities with Indian clubs, rowing machines, pulley weights, dumbbell exercises, straddle pull ups, push ups, chin ups and resistive exercises. For patients who have no draining sinuses swimming has been found to be important, from the standpoint both of recreation and of physical conditioning.

Ultraviolet Blood Irradiation Therapy in Acute Poliomyelitis: Preliminary Report on 58 Consecutive Cases

George Miley, M.D., D.Sc. (MED.) Philadelphia. In ARCHIVES OF PHYSICAL THERAPY, 25:11:656, November 1944.

This is a preliminary report on the results obtained with the Knott technic of ultraviolet blood irradiation therapy used in addition to the Kenny treatment in 58 cases of acute poliomyelitis.

Conclusion

After study of the clinical observations made in 58 consecutive cases of acute poliomyelitis in which the Knott technic of ultraviolet blood irradiation was used in addition to the Kenny treatment, it is our considered opinion that further extensive clinical studies of use of this technic in the treatment of acute poliomyelitis are warranted, in order that a more comprehensive evaluation may be obtained.

Postwar Rehabilitation and Resettlement

G. D. Kersley, M.D., F.R.C.P., Major, R.A.M.C. Specialist in Physical Medicine. In BRITISH MEDICAL JOURNAL, No. 4375:632, November 11, 1944.

Rehabilitation, the complete range of treatment continued till the fullest working capacity is restored, has exercised many minds for many months.

The field is vast, and includes not only the treatment of injuries and the scourge of rheumatism, but also planned convalescence, the prevention of breakdown in health, prevocational guidance so as to ensure correct placing of labor according to physique and mental fitness, vocational training, and provision of sheltered workshops. Yet, so far, coordination of these essentials of complete rehabilitation on a national basis is lacking.

Refrigeration in Clinical Surgery

Alfred Large, M.D., and Peter Heinbecker, M.D., St. Louis, Mo. In ANNALS OF SURGERY, 120:5:714, November 1944.

Summary and Conclusions

Refrigeration of an extremity abolishes pain and lessens the blood and lymph flow. When such refrigeration is followed by, and combined with, the application of a tight tourniquet, absorption of toxic products from an infected gangrenous extremity is, for all practical purposes, eliminated.

Because refrigeration tends to delay wound healing and decreases the power of resistance of tissues to bacterial invasion, the prolonged cooling of tissues to be preserved is not advocated. It is recommended that necessary amputations be carried out above the level of cooling.

Because a patient's general condition can be improved so greatly, during the combined use of cold and the tourniquet, by ordinary restorative measures, it is unnecessary to avoid the use of inhalation or spinal anesthesia for amputation.

Six illustrative cases cared for in accordance with the above principles are reported.

The Ilio-Tibial Band and Its Clinical Importance

James Mennell, M.A., M.D., Consulting Physico-Therapist, St. Thomas's Hospital, London. In BRIT. J. PHYS. MED. AND INDUSTRIAL HYGIENE, 7:5:144, September-October 1944.

Ober, the orthopedic surgeon of the Massachusetts General Hospital at Boston, who was the first to draw attention to the importance of pathological change in this structure, tends to solve the question of treatment by the simple expedient of open fasciotomy.

Physical Treatment

Manipulation—It is by no means every case that should lead on to operation; in fact the vast majority of these cases are amenable to physical treatment without it. Manipulation does, however, call for a considerable expenditure of energy, and any failure of technic is liable not only to increase the severity of the symptoms, but to lead to complete failure to attain the desired end. It is mainly in the hope of being able to present an adequate description of the technic that this article is written.

Treatment Activities in War Psychiatry

Lt. Colonel Lauren H. Smith, M.C. Neuropsychiatric Consultant, Ninth Service Command, Fort Douglas, Utah. In THE AMERICAN JOURNAL OF PSYCHIATRY, 101:3:308, November 1944.

The convalescent and reconditioning program

Convalescent reconditioning applies to all specialties but it is of vital importance in psychiatry not only because of its specific value in functional disabilities but also owing to the large number of such disabilities. Psychiatrists are fully aware of the value of a reconditioning program, and probably are better informed than most medical officers as to how it may specifically function. At some military installations a psychiatric medical officer has been appointed as reconditioning officer. In civilian life every physician who successfully treated psychoneuroses learned that treatment must be based on carefully planned purposive constructive scheduled activities. Psychotherapy was necessary, but in many cases failed to achieve results unless the work, play, rest and exercise of the patient were organized constructively along principles of good mental and physical hygiene.

The convalescent program is planned on such principles. It endeavors to build morale and to create attitudes designed to improve bodily functions or somatic disorders. It is a handmade procedure that is a "natural" for functional disabilities. Probably to acquire optimum benefits, the psychoneurotic convalescents should be in separate groups. They also have some needs in treatment, such as group psychotherapy, which are specifically their own. For them certain extreme physical activities should be modified, or at least the tempo of increase in such activities will have to be a little slower. The additional mental reconditioning necessary for psychoneurotics might slow up the program for other groups. These special differences are now considered by psychiatric medical officers and new ways of meeting them are progressing.

The Effect of Cooling on Wound Healing

Alfred Large, M.D., and Peter Heinbecker, M.D., St. Louis, Mo. In ANNALS OF SURGERY, 120:5:740, November 1944.

Summary

Experiments were carried out on dogs to study the effects of prolonged refrigeration on wound healing. The nature of the healing process in clean incised wounds of the skin and subcutaneous tissues of the forelimb after cooling to 6 C. for a period of 24 to 72 hours was determined, using similar incisions in the opposite limb as controls. The healing process was studied by measurements of the tensile strength and by microscopic examination of the wounds at varying intervals. The results show that during the cooling period there is no reaction on the part of the tissues to the injury inflicted by the incision, and that subsequently there is a definite lag in the healing of the wounds, the degree of delay varying with the duration of the cooling period. In wounds treated by delayed suture after cooling for 24 or 48 hours the incidence of infection is much greater than in control incisions maintained at normal temperatures.

Effects of Cooling on Experimentally Infected Tissues

Jacques Bruneau, M.D., and Peter Heinbecker, M.D., St. Louis, Mo. In ANNALS OF SURGERY, 120:5:725, November 1944.

Summary

As long as cooling to 6 C. is maintained, the subcutaneous tissues of the dog fail to show the inflammatory response usually initiated by the innoculation of "Streptococcus hemolyticus." The number of organisms present in the tissues remains remarkably constant and closely approximates the number injected.

The development of extensive subcutaneous edema during cooling and after removal of the cold, the development of a more marked inflammatory reaction, with a decrease in the growth restricting power of the tissues to bacterial organisms, suggest the possibility of harmful effects from prolonged refrigeration.

The effects of cooling are manifest in the deeper as well as in the superficial tissues of the limb of a dog with an intact blood supply.

The clinical implications of the above results are discussed briefly.

Rocker for Artificial Respiration

Dr. C. W. Hope-Gill (Billingshurst, Sussex). In BRITISH MEDICAL JOURNAL, No. 4373:565, October 28, 1944.

I have been so much struck by the efficiency and simplicity of design of a device for the carrying out of the rocking method of artificial respiration that I feel it deserves further publicity.

The rocker is provided with six pegs spaced so as to engage with the mesh of a C.D. stretcher. The pegs are of ¾-in. dowelling and project 1½ in. above the rocker. The centers of the outside pegs are at corners of a rectangle 17¼ in. x 6½ in. At each end of the head of the trestle ¼-in. iron plates are attached to form cups which hold the rocker securely when the trestle is erected.

In use the patient is firmly fastened to a stretcher while artificial respiration by Schafer's method is applied. Meanwhile the trestle and rocker are erected, the rocker being placed in a horizontal position. The stretcher is then lifted and placed on the rocker.

The Problem of the Infected Hand

E. C. B. Butler, F.R.C.S., Assistant Surgeon to the London Hospital. In THE CLINICAL JOURNAL, 2081:6:224, November-December 1944.

In the past there have been two great faults in the out-patient treatment of infected hands. First, insufficient stress has been given to restoring function to the whole hand in addition to the infected part of it; this was due to lack of cooperation with the department of physical medicine. The second fault was the pernicious habit of routine postoperative salt baths, a treatment which led in many cases either to secondary infection or to spread of the infection from imperfect immobilization.

Conclusion

Finally, I should like to enumerate the essentials of the treatment of infected hands. A sound knowledge of anatomy, accurate diagnosis (which can be achieved only by experience), rest of the inflamed part before and after operation, a knowledge of the uses and limitations of chemotherapy and the closest cooperation with the physical therapist, so that the patient may get his hand and his confidence restored to him as quickly as possible.

The Children's Bureau Makes New Regulations Regarding Services to the Crippled

Current Comment, J.A.M.A., 126:18:1154, Dec. 30, 1944.

The Children's Bureau in November 1944 amended its regulations relating to services for crippled children by adding the following provisions: "Effective July 1, 1945 it shall be a condition of approval of a plan that it provide that diagnostic services will be made available thereunder to crippled children without restrictions as to race, color, creed, economic status, legal residence, age (except as to persons above the maximum age for which such services are legally available within the state), the necessity of referral by any person other than the child's parents or legal guardian, or similar restrictions inconsistent with the free availability of such services." In December the Medical Advisory Council of the Indiana University School of Medicine pointed out that the acceptance of any child for diagnosis without restriction as to economic status and the referral of children by the parents or legal guardian only are in conflict with the established policy of the Indiana University Medical Center. The Advisory Council therefore requested the Board of Trustees of Indiana University to authorize the Indiana University Medical Center to withdraw from participation in the Crippled Children's Program of the Indiana State Department of Public Welfare whenever this new regulation is put into effect. At the same time it resolved that the Indiana University Medical Center continue to receive crippled children for diagnosis and treatment under the welfare hospital commitment program, so that no eligible and needy child would be denied clinic or hospital examination and treatment. The ruling of the Children's Bureau in eliminating any means test in the giving of governmental services for the care of the sick would seem to be in accord with repeatedly expressed policies of that agency in regard to most of the other services that it renders. More than ever the desirability that the health and medical activities of the government be coordinated under a single agency is apparent.

Role of Industrial Medicine in the Rehabilitation of Veterans

J. F. Johnson, M.D., Medical Director, Eastern Aircraft—Trenton Division, General Motors Corporation, Trenton, New Jersey. With the cooperation of H. V. Hoffman, Employment Interviewer, Eastern Aircraft—Trenton Division, General Motors Corporation, Trenton, New Jersey. In THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 126:17:1077, December 23, 1944.

It is obvious that the primary responsibility of manufacturing industry is to the former employee with a service connected disability.

There is not much difference between the returned veterans as a whole and the civilian group as a whole.

It should be recognized that not all veterans can safely be given a job in the field in which they wish to work. For instance, some with hypertensive or valvular heart disease should not be started on a training program intended to fit them for a laboring job.

The authors give a few case histories of individuals who, in their opinion, are veterans only because the preinduction military service examination did not weed them out. These cases are mentioned, not because they are typical but because it is just such a case as this that might cause the more deserving veteran some inconvenience (note the need of finding the "real" cause of discharge versus the "alleged" cause):

Eighty-five per cent of veterans now returning are satisfactory employees.

Some veterans need advice in reconstructing their own life. The need for such reconstruction frequently existed before their induction into service.

Manufacturing industry will probably employ one out of every seven veterans returning, according to our past experience.

Early Postoperative Walking: Superiority of Wire Sutures

James W. Nixon, M.D., F.A.C.S., San Antonio, Texas. In SOUTHERN MEDICAL JOURNAL, 37:12:687, December 1944.

Summary

The advantages of annealed wire sutures are described. The advantages of early postoperative walking are illustrated. It is our belief, after studying this group of 892 patients, that the use of wire sutures is not only highly satisfactory in itself but blends well with early postoperative activity. The combination of wire suture technic and early postoperative walking is demonstrated to be both safe and desirable.

Book Reviews

Surgery of the Hand. *By Sterling Bunnell, M.D., Honorary Member American Academy of Orthopedic Surgeons, Member of American Association of Plastic Surgeons, Etc. Cloth. Price, $10. Pp. 734, with 597 illustrations. Philadelphia: J. B. Lippincott Co., 1944.*

This is an appropriate monograph for this mechanized age for with the speed-up of industry and with mechanized warfare the manual worker and the soldier will, from the very nature of his work, injure his hands. Malformation, injury and infection swell the stream of crippled hands needing repair. To recondition these members successfully is difficult. Surgical reconstruction of the hand requires special careful technic to minimize adhesion formation which is so prone to bind together the nicely adjusted movable parts. It is a composite problem requiring the correlation of various specialties—orthopedics, plastic and neurologic surgery—the knowledge of any one of which is inadequate for repairing the hand. It is impractical for three specialists to work together or in series. The value of this monograph is that it shows the surgeon how to handle any and all tissues in the hand.

A physical therapist will feel that the subject of physical therapy is too short although the author in his short discussion of this subject has many excellent ideas. For instance, in discussing the exercising of stiff joints, he says: "Voluntary exercise and the use of the hand by the patient throughout the whole day is far superior in result to the usual thermal and light treatments and forceful passive motion customarily applied only one hour a day. Repeated forcing of finger joints into flexion will cause them to pain and swell and become stiffer than ever. The patient will not hurt himself, his nerves are his protection against overstraining the joints. Before and while the hand is being exercised considerable can be gained by heat, preferably by immersing the hand in moderately hot water."

This book is well illustrated and can be highly recommended to all surgeons interested in reconstructing hands. It emphasizes that though cosmetics are important, the practical object is to restore enough function to the limb to allow the patient to return to wage earning and self-support.

You Are Younger Than You Think. *By Martin Gumpert, M.D. Cloth. Price, $2.75. Pp. 44. New York: Duell, Sloan and Pearce, 1944.*

The author has avoided the attitude of helplessness that prescribes to the patient suffering from chronic ailments the monotonous formula, "Don't drink, don't smoke, and don't worry." He shows that there are only a few circumstances in which smoking and drinking in moderation are harmful. Worrying is not only permitted, but solicited, if it is done in time for its causes to be removed.

The book shows that old age is a normal state as long as its smaller reserve of energy can be balanced by smaller claims upon it. The tender years of old age are the product of culture and civilization. Old people do not live in a wilderness; they must be treated gently and protected from the harshness of nature in the same way that the trees of an orchard have to be protected from excessive heat or cold or from an invasion of beetles.

Elderly people look quite different today from elderly people a generation ago. They look younger and they feel younger. This is a book that you can recommend to your patients who have reached the age of forty, as it points the way to increased health and happiness in the longer second half of life.

Treatment by Manipulation in General and Consulting Practice. *By A. G. Timbrell Fisher, M.C., M.B., Ch.B., F.R.C.S. (Eng.), Orthopedic Surgeon to the St. John Clinic and Institute of Physical Medicine and to the Arthritic Unit, St. Stephen's Hospital (I.C.C.); Formerly Hunterian Professor of the Royal College of Surgeons of England, Officer of the Order of St. John; Trustee and Member of Executive and Research Advisory Committees of Empire Rheumatism Council and of Joint Committee of Empire Rheumatism Council and British Orthopedic Association; Corresponding Member of the American Academy of Orthopedic Surgeons. Cloth. Price, $4.75. Pp. 224, with 81 illustrations. New York: Paul B. Hoeber, Inc., 1944.*

This book calls attention of the medical profession to the great importance and value of manipulation in the treatment in carefully selected cases of certain sequelae of injuries and diseases, particularly affecting the joints, muscles and fasciae. The author correctly believes that the attitude of many of the medical profession towards this realm of surgery has perhaps, in the past, savoured a little of apathy and indifference, or even of incredulity. Fisher believes that the medical profession owe a duty, not only to the public, but to our own self-respect and prestige, to place this therapeutic measure upon a firm foundation.

In this edition many additions and alterations have been made and some sections have been largely rewritten in the light of further experience and as the result of helpful criticisms. A number of new illustrations of manipulative technic have been added.

This book should be read by the medical profession.

Theory of Occupational Therapy. *By Norah A. Haworth, M.A. (Cantab.), M.R.C.S., L.R.C.P., D.R.M., Assistant Medical Officer, London Passenger Transport Board, late Medical Officer, Horton Emergency Hospital and Senior Assistant Medical Officer, Severalls Mental Hospital, Colchester, and E. Mary MacDonald, Principal, Dorset House School of Occupational Therapy, Barnsley Hall Emergency Hospital, Bromsgrove. With Foreword by Sir Robert Stanton Woods, M.D., F.R.C.P., Consultant Adviser in Physical Medicine to the Ministry of Health, Physician in Charge of the Department of Physical Medicine at the London Hospital. Second Edition. Cloth. Price, $2.50. Pp. 148, with 68 illustrations. Baltimore: William Wood & Company, 1944.*

The foreword states in part: "The enlistment of physical means in maintaining the health of body, mind and spirit, and in its reestablishment when impaired, involves a consideration of three mutually complimentary groups of physical 'agents.' These are such passive agents as massage, electricity, thermotherapy, etc., educational and remedial exercises, and activity at some productive occupation. Occupation is essential to the maintenance of health, but it is with the use of occupation in rehabilitation that this book is concerned."

In this second edition the text has been revised throughout. A considerable amount of new matter has been added, notably in the chapter on occupational therapy in a general hospital, the treatment of cardiac cases, head injuries and arthritis. Physical exercises suitable for patients in a mental hospital are given.

This is a good textbook on occupational therapy for students and occupational therapists.

Introduction to Physiological and Pathological Chemistry with Laboratory Experiments. *By L. Earle Arnow, Ph.G., B.S., Ph.D., M.B., M.D., Director of Biochemical Research, Medical-Research Division, Sharp and Dohme, Inc., Glenolden, Pennsylvania; Professor of Chemistry, Bryn Mawr College Summer School of Nursing, Bryn Mawr, Pennsylvania, 1941-1943; Formerly Assistant Professor of Physiological Chemistry, University of Minnesota Medical School, and Lecturer in Physiological Chemistry to students enrolled in the University of Minnesota School of Nursing, Minneapolis, with an introduction by Katherine J. Densford, B.A., M.A., R.N., Director of the School of Nursing and Professor of Nursing, University of Minnesota, Minneapolis. Second edition, 1943; reprinted, 1944. Cloth. Price $3.75. Pp. 574, with 144 illustrations. St. Louis: C. V. Mosby Company, 1943.*

This is a textbook written especially for nurses and the author has done a difficult task well. The clarity of the textual material is unusual and very pleasing. Principles and concepts are clearly presented so that the average student can easily read and understand. The author has made liberal use of teaching by example and the 144 illustrations used are most helpful—simple and effective. The book is divided into three parts. Part one deals with an introduction to chemical science. Some of the outstanding chapters in this section are the metric system, chemical substances, atoms and molecules, chemical shorthand and the concept of valence, energy transformations, solutions and ionization. At the end of each chapter there are a number of study questions for review of the subject matter covered.

Part two deals with physiological and pathological chemistry, and part three gives 100 pages to an introduction to laboratory chemistry. This is a particularly useful section. However, the value of the book to the student is not alone the subject matter but rather the author's valuable method of presentation. This text should be in the hands of all nurses and physical therapists.

The Trials and Triumphs of the Surgeon and Other Literary Gems. *By J. Chalmers Da Costa. Edited by Frederick E. Keller, M.D. Cloth. Price, $5. Pp. 401. Philadelphia: Dorrance and Company, 1944.*

Dr. J. Chalmers Da Costa was the Samuel D. Gross Professor of Surgery of the Jefferson Medical College of Philadelphia 1910 to 1930. During that time every physician and medical student in Philadelphia attended his clinics and knew Da Costa. The medical profession of the world knew his textbook on surgery and it was the standard textbook on this subject for years. Here for the first time are the collected addresses and essays of this famous teacher, author and philosopher. His logic is irrefutable, and his wisdom is unique. This is illustrated in these many essays; for example, in "Objectionable People and Their Unjustifiable Longevity" he says: "Some regard amusements as criminal and would stop all theatrical performances. Such people mistake their own gloomy tempers for the spirit of holiness. Calomel would do them good," and "We habitually act on the notion that a majority is right, and of course, a majority means a majority of ignorant persons. The elections of the United States of America are supposed to be divinely inspired oracles. If a man who is so stupid that it hurts him, stands in a bar room or sits on a keg of crackers in a grocery store and puts forth imbecile views about the tariff, the Isthmian Canal, the trusts, or a League of Nations he is laughed down; his views are disregarded; and irreverant persons refer to his speech as the braying of a jackass. When, however, millions of men just as stupid express just such lunkheaded opinions upon slips of paper called ballots, we know the count indicates the voice of the great American people, and that the voice of the people is the voice of God."

These characteristic lectures and essays will interest the thousands who knew Da Costa.

Industrial Medicine. *Edited by Sir Humphrey Rolleston, Bt. G.C.V.O., K.C.B., M.D., F.R.C.P., and Alan Moncrief, M.D., F.R.C.P., with an introduction by Air Vice-Marshal Sir David Munro, K.C.B., C.I.E., M.B., Ch. B., F.R.C.S. Ed., LL. D. Cloth. Price, 16 s. net. Pp. 202, with 5 illustrations. London: The Practitioner of Eyre and Spottiswoode, Ltd., 1944.*

The introduction states: "Industrial medicine in other words is occupational medicine. General practitioners, even those who practice in industrial areas, rarely realize to the full the number of disabilities which are either caused by specific conditions of work, or are altered in character by the patient's occupation, and what is more unfortunate, they sometimes attribute the disabilities met with in their practice to conditions of work which could not possibly have caused them—a state of knowledge which is reflected in some medical certificates of fitness or unfitness for work sent in to works medical officers by general practitioners."

This is one of the series of "The Practitioner Handbooks." While the chapters are written by experts in their field in Great Britain they cover the field of industrial medicine. Industrial surgery also is considered but the reader is referred to other books in this series: "After-Care and Rehabilitation," "Fractures and Dislocations" and "Minor Surgery."

This book can be recommended to general practitioners who are interested in industrial medicine.

Massage and Remedial Exercises in Medical and Surgical Conditions. *By Noel M. Tidy, Member of the Chartered Society of Massage and Medical Gymnastics; T.M.M.G., Sister-in-Charge of the Red Cross Massage Clinic, High Wycombe. Sixth Edition. Cloth. Price, $6. Pp. 480, with 190 illustrations. Baltimore: Williams and Wilkins Company, 1944.*

The first edition of this book appeared in 1932 and it has been a standard book on its subject since that time. The principal alterations in this edition are in the section dealing with fractures. This section has been largely rewritten in order to bring the section more into line with modern methods of treatment. This section is the first three chapters.

The author gives an account of the modern methods of treatment with massage and exercise and indicates as far as possible where further information about them can be obtained. The exercises are gathered from many sources. The author is to be congratulated in that when advising passive movements it is made clear whether relaxed movements (the only true passive movements) or forced movements are to be used, since the term "passive movement" has been a fruitful source of misunderstanding in the past.

The illustrations of the exercises are excellent. The author explains that these were all taken as moving pictures, and after the whole film had been seen on the screen, the position which gave the best idea of each exercise were chosen for reproduction. In this way the illustrations give an effect of movement and activity.

This book can be recommended to physical therapists.

Physiology in Health and Disease. *By Carl J. Wiggers, M.D., D.Sc., F.A.C.P., Professor of Physiology and Director of Physiology Department in the School of Medicine of Western Reserve University, Cleveland, Ohio. Fourth Edition. Cloth. Price, $10. Pp. 1174, illustrated with 247 engravings. Philadelphia: Lea & Febiger, 1944.*

The first edition of this book in 1934 presented a thorough discussion of the functional organization of the body and explained physiological mechanisms in accordance with established laws of fundamental sciences. In addition it compared the experimental reactions which can be induced in normal organisms with aberrant reactions that occur in disease.

This fourth edition of this standard work reflects the advances in the physiological interpretation of disease and the changes in the teaching of physiology. This period of war through which we are passing has challenged physiologists to interpret not merely the natural diseases, but also those which war inflicts. At no time has the importance of physiology been more appreciated. In order to include a great amount of new material relating to war physiology and yet not increase the size of the book unduly, the author states that many topics and sections have been rearranged, rephrased, condensed or placed in smaller type. Many portions have been greatly enlarged and several new chapters have been introduced. Dr. Wiggers says that approximately one-third of the text has been completely rewritten, over 1,000 new references to original articles, monographs and reviews have been added and the number of illustrations has been increased.

Particular attention is paid to nerve degeneration, eye fatigue, color appreciation, camouflage, dark adaptation, auditory efficiency, somatic and visceral pain, headache, blood volume, hemorrhage and shock, abnormalities of blood coagulation and artificial respiration. Pulmonary edema, dietary deficiencies, undernutrition and starvation, muscular exercise, physical fitness and fatigue, water deprivation, acclimatization, and aviation physiology, with particular emphasis on the effects of pressure changes, anoxia, acceleration, and the role of proprioceptor, vestibular and ocular reflexes in flying, altitude, air and seasickness are also fully discussed.

This book can be highly recommended as a reference book to physical therapists and general practitioners, and it will continue to be the standard textbook in physiology for medical students.

Ventures in Science of a Country Surgeon. *By Arthur E. Hertzler, M.D., Halstead, Kansas. Cloth. Gratis. Pp. 304, with 86 illustrations. Halstead, Kansas: The Author, 1944.*

This book tells young physicians how much fun one can get out of the pursuit of the science of medicine in simple surroundings, neither helped nor hindered by great universities. Certainly the author knows of what he writes. There is an illustration of his "Laboratory of Experimental Surgery,"—a wooden shed, six 10 x 12 feet. Plumbing, a bucket and a dipper; heating, radiation from the occupants; sterilizing room, the family kitchen. In this building Doctor Hertzler conducted his studies in wound healing for five years.

The author, of course, is known throughout America for his book "The Horse and Buggy Doctor." In his chapter on the writing of books, Hertzler says: "For my next venture in book writing I can claim innocence. I wrote some notes on my experience as a physician for a daughter aspiring to authorship. It was in the beginning only a little sin, it was just an affair between us two. By degrees through the machinations of a friend, it grew to be a book—"The Horse and Buggy Doctor."

Every country doctor should get inspiration from this book.

The Management of Neurosyphilis. *By Bernhard Dattner, M.D., Associate Clinical Professor of Neurology, New York University; Assistant Visiting Neuropsychiatrist, Bellevue Hospital; Attending Neurologist, Bronx Hospital; Associate Visiting Neuropsychiatrist, Welfare Hospital, New York City; Associate Neurologist, Jewish Hospital of Brooklyn. Cloth. Price, $5.50. Pp. 275, with 40 illustrations and tables. New York: Grune & Stratton, Inc., 1943.*

The author is to be complimented highly upon the production of such a valuable book. It is one of the very few authentic reviews of the subject of neurosyphilis so that its publication is most welcome.

The form of the book makes it easily understandable. In the first part are discussed technics of withdrawal and examination of the spinal fluid. In these chapters one finds a very clear presentation of the significant changes in the spinal fluid and their diagnostic implications. The importance of variations in spinal fluid reactions is brought out. The second part of the book deals with methods of treatment and relates their application and results. This, too, is a very comprehensive consideration of the authorities in the field, as well as the author's own contributions.

Throughout are found statements of fact which are supported by statistics. There are no generalities and the author gives evidence for all his conclusions. This reviewer would offer only one criticism. The book could be made more readily accessible for information if the author were to summarize his own conclusions regarding treatment in a more precise and dogmatic fashion. The average reader, who is not an authority in neurosyphilis, will have to wade through a section, for example, on paresis, and finally be left without a clear impression of what the author would advise.

The book can be highly recommended to anyone dealing with neurosyphilis. Physical therapists may be particularly interested in the section on the treatment of general paresis.

Neurology. *By Roy R. Grinker, M.D., Chairman, Department of Neuropsychiatry of the Michael Reese Hospital, Chicago. Third edition, second printing. Cloth. Price, $7. Pp. 1136, with 416 illustrations. Springfield, Illinois: Charles C Thomas, 1944.*

The third edition of Grinker's "Neurology" is the best so far. There has been considerable revision and improvement over previous efforts. There is a chapter on brain tumors by Dr. Paul C. Bucy which is commendable for its clarity and brevity.

The general form of the book is very satisfactory. It covers the field of neurology comprehensibly. It is up-to-date in regards to newer forms of therapy, electroencephalography and so on. As before, the orientation has been to base clinical manifestations upon physiologic and anatomic principles. The bibliography is quite adequate and is handled in such a fashion so as to avoid confusing the reader with numerous names. The index also is a great improvement.

The book is undoubtedly a valuable addition to the standard texts in neurology. It can be highly recommended to medical students and physicians as a source of ready information about neurology.

Psychosomatic Diagnosis. *By Flanders Dunbar, Departments of Medicine and Psychiatry, Columbia University. Cloth. Price, $7.50. Pp. 741, with 18 illustrations. New York: Paul B. Hoeber, Inc., 1943.*

Doctor Dunbar has brought something of inestimable value to the medical profession in the publication of "Psychosomatic Diagnosis." In it she reviews an important phase of her well known work in psychosomatics.

The first two chapters will be of special value to physicians. The discussion of the meaning of psychosomatics, its value and the manner of obtaining and interpreting a history are clearly formulated. In the second chapter she points out special technics in obtaining information such as relaxation, free-association and the part played by psychoanalytic orientation. Throughout there are ample examples which make the section enjoyable as well as instructive.

The remainder of the book is a somewhat technical but none-the-less important review of 1600 patients with the following so-called organic disease syndromes: fractures, hypertensive cardiovascular disease, coronary occlusion, anginal syndrome, rheumatic disease, cardiac arrhythmias and recurrent cardiac decompensation. In a well documented account of these syndromes the author shows that each has a certain personality component which has or may have to do with the development of the particular type of illness. Furthermore, one gains remarkable insight into the fluctuations of these conditions as determined by environmental emotional changes. Therapeutic indications are also discussed. The complete bibliography is very commendable.

The entire book is written in simple language and is devoid of the psychiatric parlance which characterizes many such texts and deserves for them much ridicule from the neophyte. The attempt has been to keep the discussion of psychiatric adjustment on a level which could be easily understood by the average physician. The author deserves much credit for the elucidation of psychosomatics as an everyday subject. In her own words "The physician should remember that the illness is a dispute between the patient and his disease and that therefore in many cases results will be discouraging unless equal attention is paid to both participants in this dispute."

Lectures on Reconstruction Surgery. Selected from the Instructional Courses of the Tenth Annual Assembly of the American Academy of Orthopedic Surgeons. *Edited by James E. M. Thompson, M.D., Lincoln, Nebraska. Cloth. Price, $8. Pp. 568, with 972 illustrations. Ann Arbor, Michigan: Edwards Brothers, Inc., 1944.*

These lectures consider bone reconstruction: nonunion, bone defects and malunions; joint reconstruction: arthrodesis versus arthroplasty, shoulder joint and knee joint reconstruction; regional reconstruction of the hand and foot; and reconstruction of soft tissue defects: skin plastics, nerve defects and muscle transplants.

Dr. Theodore Willis, assisted by an able faculty, gave a course on "Lame Backs" which, although not related to reconstruction surgery, was considered of sufficient significance at this time to be published herein. Physical therapists should read the following lectures given in this course: "The Treatment of Low Back Pain Due to Functional Decompensation" by Emil D. W. Hauser, M.D., and "The Role of Faulty Body Mechanics in the Military Lame Back" by Lt. Col. Vernon P. Thompson, M.C., U.S.A.

This is a "must" book for orthopedic surgeons.

Improvised Equipment for the Physically Handicapped. *By Margaret S. Arey, R.N., Assistant Consultant in Orthopedic Nursing, National Organization for Public Health Nursing. Paper. Pp. 63, with 55 illustrations. Gratis, 1790 Broadway, New York 19, N. Y. Joint Orthopedic Nursing Advisory Service of the National Organization for Public Health Nursing and the National League of Nursing Education, 1944.*

Physical therapists constantly see patients who are physically handicapped and who need equipment which will improve their functional activities. This pamphlet describes and illustrates equipment which can be constructed in the home or hospital by a carpenter and with small outlay of money. Some of the devices described are a cutout table with runner chair; a special drinking cup; a fork and spoon with plastic hand grips; practice shoes; toys; writing aids, as a chair and desk with removable board; walking aids, as an abduction walking board, footprint board, parallel walking rails, adjustable walker; supports, such as a chair foot support, a footboard box, calf cuff to control foot drop; a brace chair for a child in long leg braces with locked knees; a relaxation chair; a sled chair; a chair on wheels; a toilet chair; a wheel chair escalator which is a runway constructed to reach from the porch of the house to the sidewalk with a strong rope attached to the back of the wheel chair by a pulley and running through another pulley on the floor of the hallway of the home.

Much of the material illustrated in this handbook was designed for patients with cerebral palsy but it can be adapted to fit the needs of patients with other types of disabilities. Every physical therapist needs this booklet.

The Analysis and Interpretation of Symptoms. *Edited by Cyril M. MacBryde, M.D., Assistant Professor of Clinical Medicine, Washington University School of Medicine; Director, Metabolism Division, Barnes Hospital, St. Louis, Mo., with nine contributors. Cloth. Price, $4. Pp. 302, with illustrations. Philadelphia: J. B. Lippincott Company, 1944.*

The articles in this book give the basis for analysis and interpretation of some of the commonest symptoms which bring patients to the physician. Emphasis is placed upon the pathologic physiology of the symptoms, while its correlation with other symptoms and with physical and laboratory evidence is considered as important, but secondary in the diagnostic method. Our knowledge concerning many of these symptoms is incomplete and as yet is rapidly expanding. Although the final word often cannot be said, critical and analytical thinking is followed in all of these articles.

A complete picture of a disease is an important means of medical education, but the patient confronts the physician complaining of severe epigastric pain or of headache or of jaundice. No mechanical measures can take the place of careful consideration of the patient's complaints. No device, be it ever so clever mechanically, electrically or chemically, can serve as a substitute in the art of medicine for the informed mind of the physician. His ability to diagnose will depend in only a minor degree upon his ability to use special technical measures. This book is valuable to the physician because it tells when to use these measures, which tests to select and how to interpret the physical findings as well as the special laboratory tests. This book is recommended to the third and fourth year medical students, internes and physicians.

Burma Surgeon. *By Gordon S. Seagrave, Lt. Col., M.C., U.S. Army. Cloth. Price, $3. Pp. 295, with 23 illustrations. New York: W. W. Norton & Company, Inc., 1943.*

In the North Shan States long before the present war, Doctor Seagrave was a medical missionary. The Burma Road was near his hospital and the Chinese War called on the physician's help. When the United States came into the war, Doctor Seagrave was commissioned a Major in the Medical Corps by General Stillwell. This is the story as one physician saw it of the days and nights of Japanese bombing. His crew performed emergency operations amid the flames of burning towns. When the order came he joined the retreat. The author's description of this retreat is most vivid.

It is interesting to read of this retreat and to read in the news how the tables are turning. "Lieut. General Daniel I. Sultan last week had Bhamo surrounded, needed only 65 more miles to link India with the Burma Road. Because the Japs' main bodies had been forced toward south Burma, there was some reason to hope that the 65 miles might not be too long or too bloody." Now, more than ever, the Road was a military "must."

This book gives a vivid picture of the hardships that our troops went through when we gave up the Burma Road. The book is filled with adventure and is highly recommended.

Segmental Neuralgia in Painful Syndromes. *By Bernard Judovich, B.S., M.D., Instructor in Neurology, Graduate School of Medicine, University of Pennsylvania; Clinical Instructor in Neurology, Women's Medical College; Chief of Neuralgia Clinics, Philadelphia General Hospital, Graduate Hospital and Women's Medical College Hospital, Philadelphia, Pa., and William Bates, B.S., F.A.C.S., F.I.C.S., Professor of Surgery, Graduate School of Medicine, University of Pennsylvania; Consulting Surgeon, Babies' Hospital and Philadelphia Home for Incurables; Consulting General Surgeon, Wills Hospital, Philadelphia, Pa. Foreword by Joseph C. Yaskin, M.D., Professor of Neurology, Graduate School of Medicine, University of Pennsylvania, Philadelphia. Cloth. Price, $5. Pp. 313, with 178 illustrations. Philadelphia: F. A. Davis Company, 1944.*

This monograph shows that clinically the interpretations of pain can be greatly facilitated by eliciting hyperalgesic or tender skin zones which accompany the pain. The authors show that the presence of tenderness, and its distribution, whether local or segmental, has been of great aid in diagnosis and therapy.

These authors base their monograph upon the fact that clinically the combination of segmental pain and tenderness usually appears to be due to factors which irritate roots, ganglia or trunks of the spinal sensory nerves, and not due to painful impulses originating in diseased viscera. It is emphasized that in the chest and abdomen segmental pain and tenderness may simulate the pain of visceral disease, and many patients who have submitted to medical treatment and surgical procedures are not relieved of pain until treatment is directed to the somatic of the pain and its cause.

This book is of interest to physical therapists as the chapter on posture is taken directly from Doctor Carnett's original article. *It may be remembered that Doctor Carnett expressed these views in* THE PHYSIOTHERAPY REVIEW *some years ago.* In this chapter on posture in relation to abdominal pain and tenderness and ptosis of the abdominal organs, the authors state: "Since the main causes of segmental pain and tenderness are primarily excessive lumbar lordosis, scoliosis, and spinal arthritis, our search for the best method of overcoming these postural defects led to our adoption of the special exercises devised by Goldthwait and his associates." They also advise that a shortened lower extremity should have a heel lift to correct the discrepancy. Under physical therapy they say: "In general, the application of various forms of heat appears to afford the greatest comfort. . . . Galvanism with or without the use of ionizable medication such as histamine or acetylcholine, in our experience, does not appear to be of value."

This monograph is of value to every physician as it presents a definite and useful advance in our clinical and therapeutic approach to neuralgia and painful syndromes.

Common Skin Diseases. *By A. C. Roxburgh, M.A., M.D., B.Ch., Physician in Charge of Skin Department and Lecturer on Diseases of the Skin, St. Bartholomew's Hospital; Consultant in Dermatology, Section III, Emergency Medical Service; Consulting Physician and Lecturer, St. John's Hospital for Diseases of the Skin; Dermatologist to the Royal Masonic Hospital; President, Section of Dermatology, Royal Society of Medicine; Late Editor, British Journal of Dermatology and Syphilis; Late Vice President, Section of Dermatology, British Medical Association; Late Temporary Surgeon, Royal Navy; Corresponding Member of the Danish Dermatological Society. Seventh Edition. Cloth. Price, 18 s. Pp. 486, with 192 illustrations. London: H. K. Lewis & Company, Ltd., 1944.*

This is one of the General Practice Series. It is not a complete textbook for it deals, as its title suggests, with the common skin diseases. The author states that there is no account given of the technic of electrical, x-ray or radium treatment as it is improbable that general practitioners will use these themselves. The indications for such treatments and the results to be expected, however, are dealt with. Ultraviolet radiation and Carbon Dioxide Snow which are used by many practitioners are described in more detail.

In this seventh edition the section on industrial dermatitis has been expanded on account of its rapidly increasing importance, also the sections describing other types of dermatitis due to external irritants both vegetable and chemical. The chapters on scabies and avitaminoses have been rewritten. The sections on mites, pediculosis, impetigo, monila infections, and sulphonamide eruptions have been revised and enlarged. Paragraphs have been added on immersion foot and on the treatment of sycosis, impetigo and blepharitis by penicillin. Five new illustrations have been added.

It can be recommended to the general practitioner as it deals adequately and readably with the common skin diseases.

Microbes That Cripple. *Written and illustrated under the direction of Edward L. Compere, M.D., by T. Arthur Turner. Cloth. Price, $2.50. Pp. 241, with illustrations. Elyria, Ohio: The National Society for Crippled Children, Inc., 1944.*

Physical therapists constantly treat cripples and are continually asked all manner of questions about the causes of this crippling by the parents and friends of the children. Here for the first time is a book that you can read or advise the querist to read to answer these questions.

In the prelude to parasitology the authors give the interesting history of Pasteur's predecessors—Pliny the

Elder, Fracastorius, von Plenciz and Henle and describe the evolution of the microscope and how Pasteur started the conquest of crippling.

The book is excellently illustrated, many of the drawings are schematic but all are entertaining and explain the text.

So many questions are answered that a brief review of some of them might be interesting: bacterial forms, bacteriophage, Koch's postulates, microbal dissociation, immunization, pathogens, history of Jenner and vaccination, types of immunity, complement fixation, a simple explanation and excellent diagram illustrating the action of joints. The main thread of the story flows along easily, and the chapters are as easy to read as their titles: microscopic toughie—the tubercle bacillus; spirochete with a record; poliomyelitis and the virus cripplers; the chain gang—hemolytic streptococcus (rheumatic fever); bacterial free-for-all (arthritis); accessories before the fact (measles, whooping cough, influenza); the story of chemotherapy and public hygiene and the prevention of crippling. At the end of the book there is an excellent glossary and a bibliography.

This book is highly recommended to physical therapists for their reading and to recommend to intelligent laymen to keep them aware of the march of science.

Normal Lives for the Disabled. *By Edna Yost, in collaboration with Dr. Lillian M. Gilbreth. Cloth. Price, $2.50. Pp. 298. New York: The Macmillan Company, 1944.*

This monograph is divided into four parts. Part I is on making up your mind to work. It emphasizes that a man is more important than any of his parts, and that a disabled man discovers that it is what he is and has, rather than what he is not, that is the real problem, and that it contains the solution within itself. It shows that the man within must be bigger than his pride and that the man's future is dependent upon whether the "inner" man prefers to work or loaf. This part should be read by every handicapped man or woman as it urges them as early as possible to help themselves.

Part II on getting ready for work explains what the laws provide, the therapies that restore, about artificial appliances and on choosing your vocation.

Part III discusses the attitude of business and industry and the job of the disabled person. Part IV shows that the future of the handicapped is more certain than it was twenty-five years ago and considers this future.

The authors have long been conscious of physical handicaps in the lives of people. Edna Yost organized the War Work Center in Long Island City, under the Y.W.C.A. This was one of America's three largest war-industry centers in the First World War. Dr. Lillian Gilbreth is one of the outstanding women engineers of the world and is Professor of Management at Purdue University.

This book should be read by everyone who has a physical disability of any kind, for it shows that, with relatively few exceptions, handicapped persons can attain economic independence and a normal social existence. It should also be read by the families and friends of these persons, because it shows that the disabled person is on the hot spot and it is up to this person to get off it to his own advantage instead of sliding off it onto somebody's lap: your family's or even Uncle Sam's lap.

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